the OIL AND GAS JOURNAL

PUBLISHED WEEKLY DECEMBER 28, 1959

World-Wide Oil Report p. 90

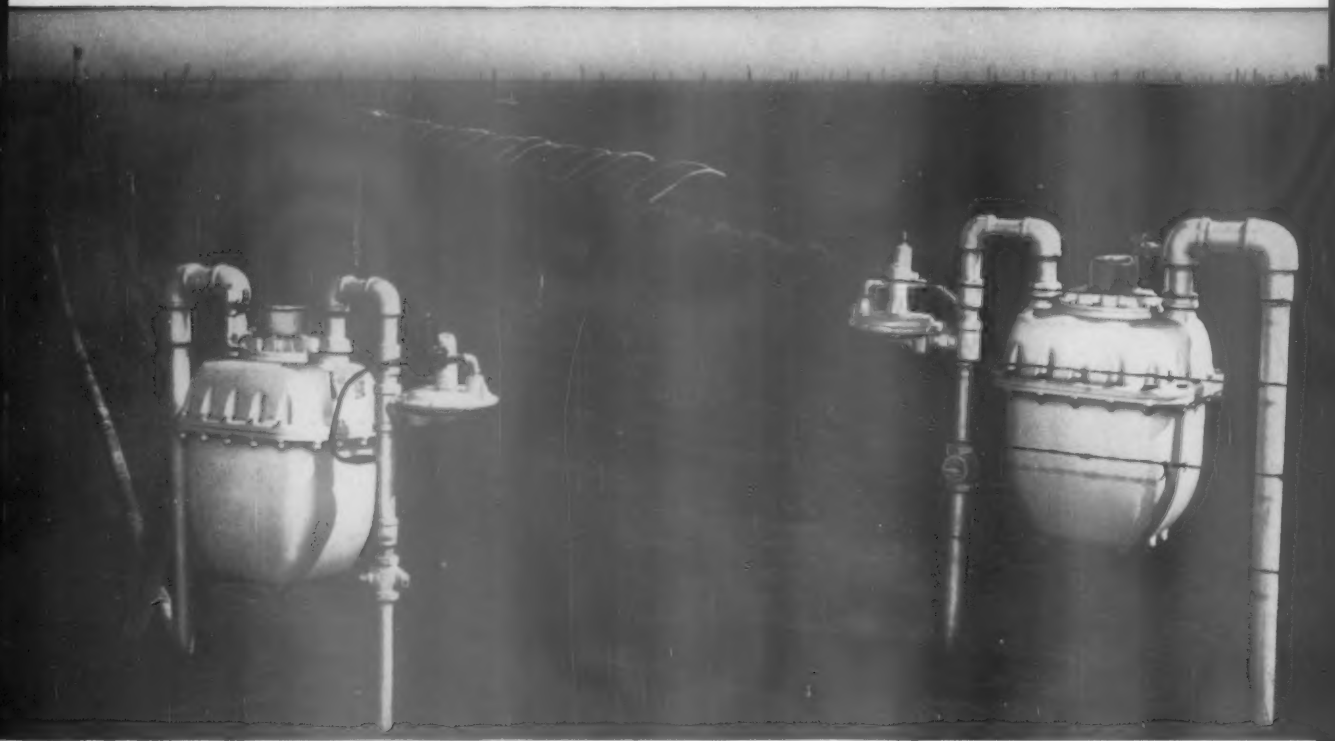
Nobody's hurting for oil-country steel ▸ 72

Refiners meet seasonal demand from stocks ▸ 74

What to expect in Washington in '60 ▸ 78

What's making Houston grow as oil center ▸ 80

For irrigation . . . or any field service up to 100 psi



Two Rockwell "1600" meters with Rockwell "173" regulators (gas loaded) serving engines pumping water to irrigated fields in Texas.

Lightweight, Portable, Sturdy

ROCKWELL "1600" ALUMINUM GAS METERS

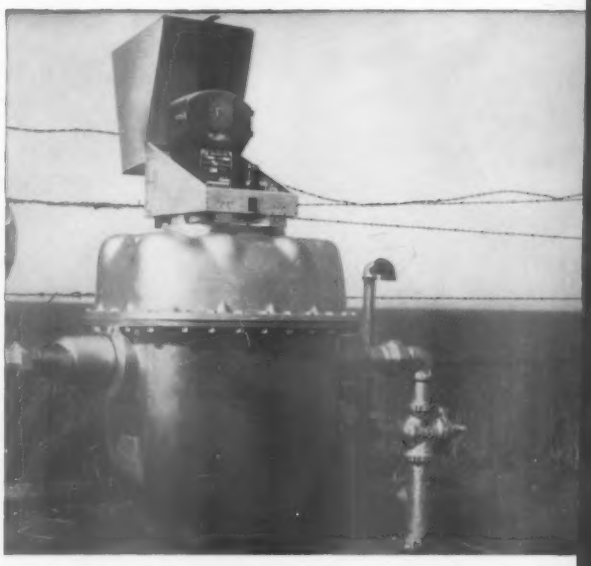
Whatever your needs for field measurement, you can fill these needs best with the Rockwell "1600." Just consider these advantages. The Rockwell "1600" has a rust-proof, impact-resistant aluminum alloy case. Weighing only 63 lbs., one man can easily carry and install it. Single joint construction reduces the possibility of leakage—simplifies access to the inner mechanism, which is removable and interchangeable as a unit.

There's a generous capacity rating of 1600 cfh at 4 oz. inlet pressure. This capacity can be increased substantially by measuring gas at higher pressures—up to 100 psi. Corrections to base pressure from higher pressures are accomplished by fitting the "1600" with either an Emcorector or a Combined Record gauge. Write for literature. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ALUMINUM GAS METERS

another fine product by

ROCKWELL



This Rockwell "5000" aluminum meter with Emcorector is the master meter for five irrigation wells, submetered by five Rockwell "1600" meters.

OIL AND GAS JOURNAL
Vol. 57 No. 53

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The Oil and Gas Journal is published weekly with an additional issue in January by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1959 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

Annual index available on request.

WORLD-WIDE OIL REPORT

Summary of Journal Survey 90

A comprehensive table puts total figures for world-wide refining, production, drilling, and reserves at your fingertips. Included are total petroleum figures for each nation and a country-by-country index for the individual reports on succeeding pages.

Latin America 92

Here are details and tables on oil countries from the Rio Grande to the southern tip of Argentina.

Europe 106

Included among the European figures for the first time is a report on the oil picture in Russia and its satellites, as well as Yugoslavia.

Middle East 117

Mounting production and drilling figures in these volatile half-West, half-East nations show why this area is claiming more and more attention from oil men.

Asia-Pacific 124

Oil hunters keep probing this vast area in search of a really big producing area to rival the Near East or Venezuela.

Africa 131

Here are the facts and figures which show why many oil men consider this the new petroleum hot spot of the world.

With Lacq, France Gets Into the Sulfur-Export Business 138

By Andrew E. Chute

When planned expansions to the gas-processing plant at Lacq are completed, France will convert from a sulfur-importing to a sulfur-exporting nation.

Oil's Next 10 Years 149

Long-range forecasts by economists from Shell International Petroleum Co., Ltd., give readers a look at what the oil scene may be like a decade from now.

Tanker Surplus Keeps Growing 164

By Loren F. Kahle

In direction and in degree the outlook for the tanker industry is about the same as last year. Tanker supply still seems to be increasing more rapidly than tanker demand.

Rotterdam-Rhine Line Will Supply German Refineries by Summer 170

By M. Swiss

Crude oil should be reaching the Ruhr area in Germany by June through the 183-mile Rotterdam-Rhine line now under construction.

Shell's First Gasification Plant is a Commercial Success 174

By A. P. Van Amstel

A new oil-gasification plant in Holland has proved a practical investment for Shell.

Insert Map

An oil-man's view of the Mediterranean area is given in a special four-color petroleum map included in this issue of The Oil and Gas Journal. Here in one map is an up-to-date report on all oil and gas fields, refineries, and petroleum pipelines in the North Africa-South Europe-Near East area. Special insets show details of Iran, Kuwait, and Saudi Arabia.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Dec. 28, 1959

Free world's oil industry enters 1960 in better shape:

Brightest spot is demand.
Indications are the 7% increase in world demand expected for 1959 was easily exceeded. Consumption is still rising too.

Top achievements of the year world-wide:
...North Africa's emergence as a new oil province.
...Reserves rose 5.7% with all areas contributing.
...Production up 3.5% as demand continues to nibble at mountain of excess crude available.
...Drilling activity up 1.9%.
...Refining capacity up 4.2%.

The problems 1960 will inherit: An increasing surplus of crude...Increasing political pressure from local governments (p. 70).*

▼ ▼ ▼

How government bureaus see oil for 1960:

Bureau of Mines is forecasting domestic demand for all oils at 9,864,000 bbl. daily, increase of 3.9% over 1959.
For first half, increase of only 3.1% in demand is seen because of the effect of the steel strike. But bureau anticipates a 4.6% upswing in the last 6 months.
Other bureau estimates: Crude production up 5.4%, gasoline demand up 3.2%, kerosine a slight decline, distillate up 4%, and residual up 2.3%.

Drilling activity will be up 3%, carrying with it a similar increase in machinery and equipment purchases, the Commerce Department's business and defense services administration says.
BDSA notes that factory shipments of oil-field machinery and equipment during 1959 were about 16% above 1958.

Domestic oil has a big year coming up in Washington.

---

*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

You can expect:

...Imports controls to face some major changes.

...FPC to decide what to do about the Phillips case and thereby try to set pattern for gas-price regulation.

...One more try at a natural-gas bill.

...Supreme Court to settle offshore boundaries.

Others: Tax changes, highways, mergers, and a controversial drive for a governmental fuels policy (p. 78).

Court challenge of import allocations is being planned by Gulf Oil Corp.

Test will come if Gulf fails to win request to Oil Import Appeals Board for a 35,000-bbl.-daily increase in its residual fuel quota for the first half of 1960. Gulf's quota is for 2,504 bbl. daily.

Eight others, including Tidewater, have filed appeals, and number is expected to increase before the January 15 filing deadline.

▼ ▼ ▼

Mississippi has an important oil field at McComb.

Two extension wells have just expanded the field both west and southwest. Field is less than 5 months old and it already has nine oil wells without any failures.

Drilling is under way at eight wells with eight more locations staked out (p. 76).

Heavy drilling campaign in Argentina's huge Comodoro Rivadavia producing area will follow current 1,800-well program.

Total probably will soar to 4,000 or more.

Foreign contractors now at work or soon to begin work on contracts already let have the inside track on new jobs. Best odds are these firms will get supplemental contracts which will at least double the number of wells they are now engaged to drill.

This means Southeastern Drilling Co. will have 2,000 wells rather than the currently contracted 1,000; Kerr-McGee 1,000 rather than 500; and ENI, the Italian Government company, 600 rather than 300.

Scientific analysts returning from Russia give this report for geophysics:

Russian exploration crews appear on about U. S. level, but their instruments are inferior.

After failing to buy instruments in the free world on a license basis, the Russians built their own. They now are selling India gravity meters at one-third U. S. costs. But one geophysical tool they have not yet developed is the airborne gravity meter.

Exploration notes: Cardium sand of Pembina fame is back

in Canadian news with prolific successes at Westcott and Carstairs in the Calgary area...First production in Michigan basin from St. Peter and Knox dolomite of Ordovician and Cambro-Ordovician age looms at Fulk 1 Zarembra in Jackson County. ...Union-Ohio is making final tests of third gas producer on Kenai. It should fulfill commitments to Anchorage Gas Co. Further development of field will depend on Anchorage demand.

▼ ▼ ▼

Clue to FPC's reception of El Paso Natural's new contracts with Permian basin suppliers may be found in its decision in the Texas Eastern-Skelly case.

El Paso in its contracts eliminated spiral-escalation and favored-nation clauses.

FPC, with Commissioner Connole dissenting, accepted higher wellhead prices for Skelly which gave up favored-nation and price-redetermination clauses.

Trend toward increased yard application of external pipeline coatings is appearing.

The reason: Much of the gas trunk-line pipe is being internally coated. And while the pipe is in a yard for this purpose, it's cheap to apply the external coating at the same time. Also the job is better than field application over the ditch.

Application to kick off long-standing plan to import Canadian gas into New York is expected before FPC soon.

Tennessee Gas Transmission has a contract with Trans-Canada to purchase surplus gas at the international border at Niagara, N. Y. Facilities through which U. S. gas formerly was delivered to Toronto would be used.

▼ ▼ ▼

Union Oil Co. is moving into the Orient in a joint venture with Maruzen Oil Co. of Japan.

Result is Unimar, a $10-million integrated oil firm with offices in Hongkong. Unimar at first will emphasize marketing in Southeast Asia and the Middle East. Products will come from Maruzen refineries in Japan and Union Oil's plants in the U. S.

Directors and operating officers will be equally divided between Japanese and American citizens.

Demand for kerosine-type jet fuel will soar in the next 2 years.

World's commercial jet-plane fleet totaled only 732 aircraft on November 1. Total will jump to 1,340 by end of 1961. Most of planes to join the fleet are vastly more fuel-hungry pure jets.

When present deliveries are complete, there will be 559

pure jets and 781 turboprops in operation. In the U. S. pure jets will outnumber turboprops 300 to 295, but abroad the turboprops will be more numerous, 486 to 259.

▼ ▼ ▼

A new trend in refining operations: Managers are paying less attention to seasonal changes in demand in planning their runs.

Advantage is reduced over-all processing costs. Danger lies in building excessive inventories and thereby depressing product prices.

The trend calls for attention to increasing storage capacity for off-season products or changing yields to fit seasonal demand (p. 74).

Phillips will install a residuum catalytic-cracking unit in its Borger, Tex., refinery.

Construction will be completed within a year.

Entirely new thinking in catalytic conversion of residuum is represented in the Phillips-developed process. The Borger unit will incorporate many processing firsts for this refining field.

Commercial plants to strip helium from natural gas will be big goal in 1960 for Interior Department.

It will be an "either-or-else" proposition—either the industry will build the plants or the Government will.

▼ ▼ ▼

Banks are tapping oil-company experience in setting up their own credit-card business.

Several major banks have dipped into the oil companies for experienced credit men to direct new bank charge-plan departments.

On Taxes: Sinclair is challenging Wyoming's mandatory 5-mill property tax, a new levy assessed only in school districts which have no high schools (p. 73)...California faces new threat of severance tax. Gov. Edmund Brown plans to revive issue in legislature despite defeat there earlier in year...Colorado Supreme Court upholds state's gross income tax on oil but California Co. may carry its fight against the levy to the U. S. Supreme Court (p. 85)...

Pay checks will be a little lighter starting in January. The Government will increase its take for social security.

New rate: 3% on first $4,800 of earnings or $144 yearly matched by like amount paid by employer. Rate in 1959 was 2% on first $4,800 or $120 yearly.

By 1969, even without changes in benefits, yearly tax will reach total of $432 or 9% to be shared by worker and employer.

Good Wells Make Good News

A Report On Acid Treatments Engineered With the "Acid Guide"

December 28, 1959

The "Acid Guide"*—developed by Dowell—is the newest aid to the systematic engineering of acid treatments. Early results have been extremely successful, as these four examples show.

- **Stafford County, Kansas** (New Oil Well) This well was completed into the K, J and H zones of the Kansas City Lansing formation. There was no production before treatment. The object was to get an optimum production increase from each zone. Dowell engineers, with the aid of the "Acid Guide," recommended a five-stage treatment. The first two stages were wash treatments using BDA* (Breakdown Acid). Well was swabbed after each stage to remove as much mud as possible. Then each of the three zones was treated separately with Retarded Acid. Straddle packers were used to isolate zones. After clean-up, well tested a satisfactory 37½ boph.

- **Kingfisher County, Oklahoma** (New Oil Well) Completion was through two sets of perforations into the Oswego lime from 6257 to 6262 feet and from 6279 to 6282 feet. Production was increased from a show to 2 boph after 500 gallons BDA (Breakdown Acid). Standard treatment for wells in this field has been 10,000 gallons regular acid. Dowell used the "Acid Guide" and recommended injecting only 1500 gallons Retarded Acid at 5 bpm. Production increased to 7 boph—as good or better than earlier treatments. Operator saved $1350 in acid costs alone.

- **Archer County, North Texas** (New Oil Well) Pay was the fast-reacting Caddo lime. Completion was through perforations from 5200 to 5230 feet. Production was only a show. The "Acid Guide" indicated that the optimum treatment would be 5000 gallons Retarded Acid (acid-oil emulsion type) injected at 6 bpm. After clean-up following treatment, well tested 18 boph, flowing, on a 20/64 inch choke.

- **Western Alberta, Canada** (New Gas Well) This well was completed into the slow-reacting Wabanum formation. Perforations were from 11,042 to 11,094 feet. Production before treatment tested 5.8 mmcfd open flow. Acid treatment was engineered using the "Acid Guide." 10,000 gallons Dowell acid (with silicate control and surface-tension-reducing agents added) were injected down tubing at 7 bpm. After treatment, the well tested 33.5 mmcfd, open flow—more than a 500 per cent increase!

Whether you want lower treatment costs or greater stimulation, it will pay you to investigate the "Acid Guide." For service or detailed information, contact the Dowell office or station nearest you. There are more than 150 locations in the United States, Canada, Venezuela and Argentina. Dowell, Tulsa 1, Oklahoma.

*DOWELL SERVICE MARK

Services for the oil industry DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Norris Suggests:

TAKE CARE

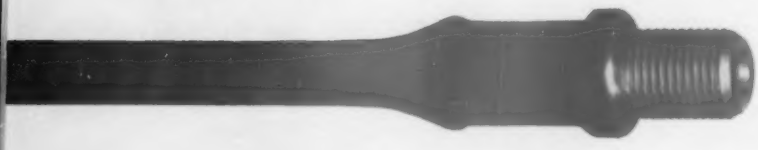
in making-up string

Reduce your pumping Costs

Helpful Hints

- Rods in singles only should be tailed into the derrick for running and should be handled with special care, avoiding bending, and contact with ground, walk, or ramp.
- Do not remove thread protectors until rods are hanging in derrick.
- After removal of protector, "dope" or lubricant should be applied to pin thread.
- Use proper wrenches in making-up rod joints, applying recommended torque.
- Use torque type wrenches if available. Never hammer the box in making-up.
- Elevators, hooks, and wrenches should be kept in good operating condition, clean, free of scale or paraffin, and with good working surfaces at points of contact.
- Full make-up torque should be attained after contact of shoulder and face in each joint make-up.

Norris supplies the right rod... give it the right care!



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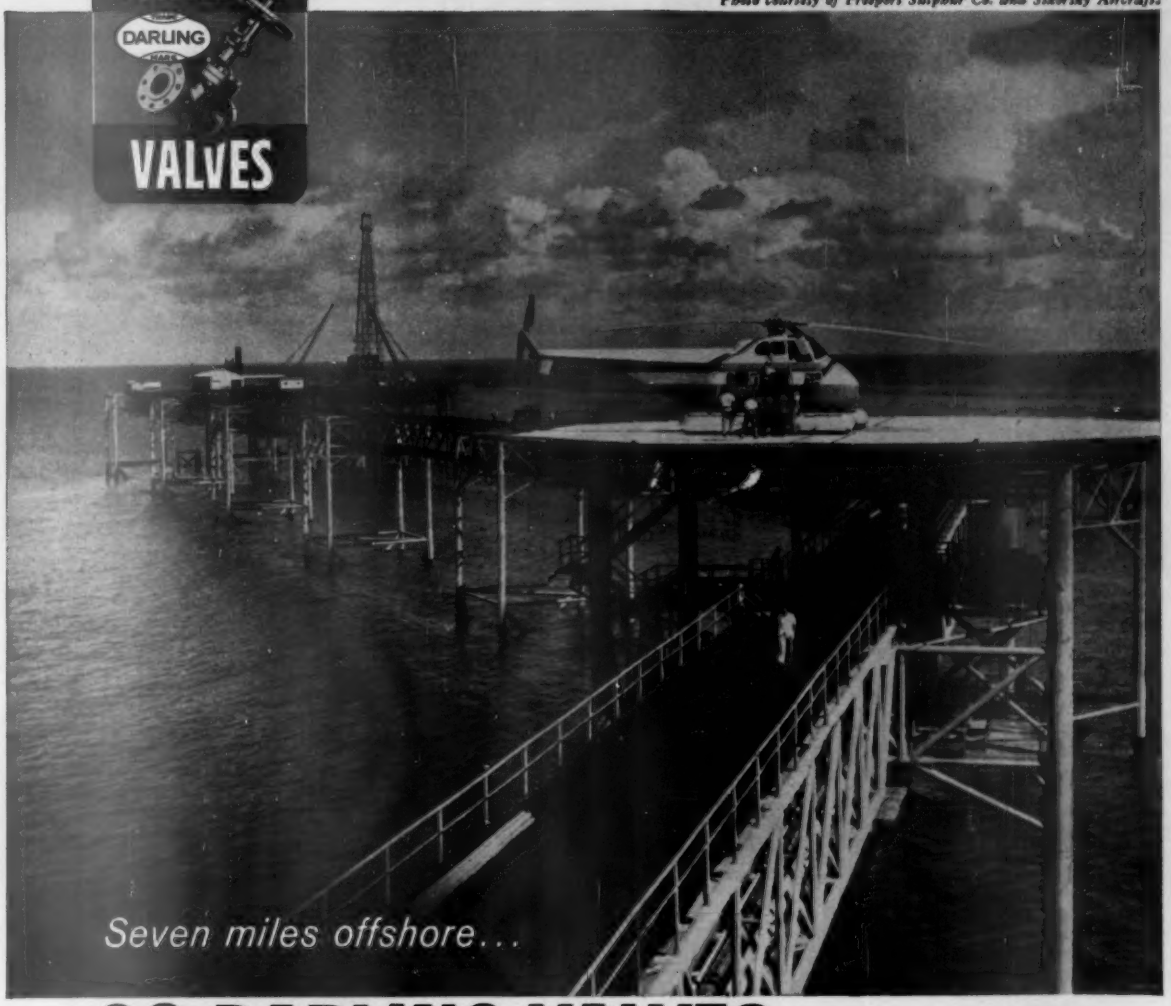
DARLING

VALVES

Photo courtesy of Freeport Sulphur Co. and Sikorsky Aircraft



90 DARLING VALVES

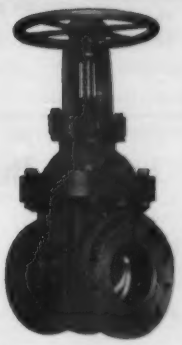
to help tap new sulphur deposit

Above you see part of Freeport Sulphur's $30,000,000 project to tap a major new sulphur deposit. It's the world's first offshore sulphur mining plant at Grand Isle...seven miles off the coast of Louisiana in the Gulf of Mexico. Production is planned to start in 1960.

Valves on the mile-long "steel island" mining plant were supplied by Darling. They include 2" to 12" OS and Y and 6" to 10" check valves made from Ni-Resist with monel trim . . . all for use in corrosive service.

Here's another case where Darling's extensive research and development on corrosion-resistant valves helped solve a specialized operating problem. And on gate valves, Darling's *exclusive revolving double disc parallel seat feature* assures positive sealing and ease of operation at all times.

Let us assist *you* on applications where "just ordinary valves" won't do. Write or phone us about your valve requirements. Or we'll gladly have a Darling sales engineer call.



Darling OS and Y gate valve with flange ends...one of types being supplied for Freeport Sulphur's Grand Isle sulphur mining plant.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pennsylvania

Manufactured in Canada by Sandilands Valve Manufacturing Co., Limited, Galt 19, Ontario

This Super 48 is operating as the regular drilling pump on a Rowley Drilling Company slim hole rig in Mississippi. It is direct connected to its prime mover through two-speed gears and torque converter, and everything is unitized on a single skid-base.

"Oilwell's" SUPER 48 is Portable-Flyable and FIELD PROVEN in high-pressure drilling service

Look at this data!

TYPE	triplex, single acting
CAPACITY	to 750 gpm
PRESSURE	to 10,000 psi
INPUT BHP	to 700 (intermittent)
WEIGHT	8,300 lbs. (pump without skids)
DIMENSIONS	7'6" x 4' x 3'6"
POWER FRAME	enclosed one-piece alloy steel weldment
FLUID END	forged alloy steel with quick-opening hammer-lug valve caps and cylinder heads
PLUNGERS	CO-HARD, with pressure lubrication
VALVES and SEATS	stainless, wing-guided slush type

Super 48's can be applied in a variety of arrangements. They are suitable for mechanical or electrical drive, with or without torque converter. They can be unitized singly or in multiples, with suction boosters, desanders and dampeners included if desired.

For further information on this interesting new product, contact your nearest "Oilwell" area or district office.

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Oil Well Supply Division of United States Steel

Executive Offices: Dallas, Texas
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WECO Tool Joint Compounds, Zinc-base No-Gall and Lead-base Lo-Tork, meet every requirement for right doping. Finely screened pure metallic zinc or lead is dispersed in a neutral oil with a tacky additive for real thread protection. WECO Compounds never require thinners and are not affected by extremes of hot or cold weather.

Dope your string right! See your Supply Store for No-Gall, 50% pure metallic zinc base, or for Lo-Tork, 50% metallic lead base . . . the best thread protection your string can have.

C-2-58

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HOUSTON, TEXAS

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Here's an adjustable speed drive that allows *truly precise* machine operation. Speed regulation is automatic and stepless — results in faster, more efficient production at lower cost, with less waste, and minimum wear on equipment.

These and other benefits are yours when you use the improved Louis Allis Ajusto-Spede drive. For example, it can be set before or during operation to deliver any desired speed within its range. Its *exclusive* tachometer feedback circuit monitors the output speed and *automatically corrects speed and holds it* regardless of load changes.

This improved drive requires minimum maintenance. Its stationary field has no brushes, commutators, or slip rings to cause trouble. The source of power is an equally trouble-free standard a-c squirrel cage motor.

®Ajusto-Spede is a registered trademark of the Eaton Mfg. Co.

The cast-iron housing keeps out dirt, chips, and moisture — resists corrosion.

The compact Ajusto-Spede also saves space. Integrally-mounted motor and drive simplify handling — can be easily adapted for installation on new or existing machines. Controls can be mounted at the machine or any other convenient position.

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MATERIALS • TOOLS • TECHNIQUES

LIGHT WEIGHT ADDITIVES

Pozmix*
Gilsonite*
Howcogel*
Diacel D
Expanded Perlites

CEMENT RETARDERS

HR-4*
HR-7
Diacel LWL
Saturated Salt*

HALLIBURTON SPECIAL

HEAVY WEIGHT ADDITIVES

Hi-Dense No. 2*
Barite*
Ottawa Sand*

SPECIAL ADDITIVES

Mud-Kil
Radioactive Tracers

LOW WATER LOSS ADDITIVES

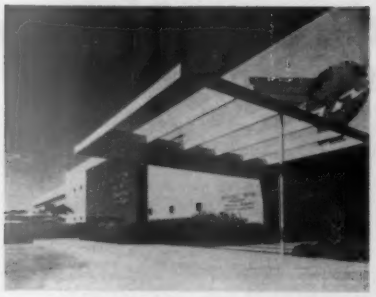
Diacel LWL
Howco LA-2 Latex
AMCY*

CEMENT ACCELERATORS

HA-5*
Calcium Chloride
Sodium Chloride*
Diacel A
Cal-Seal*

SPECIAL CEMENTS

Pozmix Cement*
Pozmix 140*
Latex Cement
Resin Cement*
Diesel Oil Cement*
Cal-Seal*
Hydromite*



HALLIBURTON DUMP BAILER MATERIALS

Hydromite*
Resin Cement*
Cal-Seal*
Hydro-Lok (PC-11)*

HALLIBURTON WATER CONTROL AGENTS

Hydro-Lok (PWG)*
Hydro-Lok (PC-11)*
Hydro-Lok (HG-10)*
Blox-All*
Howco-Suds*
Howco-Sorb*
Isoperm Process*
Hydromite*

LOST CIRCULATION MATERIALS

Gilsonite*
Howcogel*
Perlites
Flocele*
Tuf-Plug
Palco-Seal*
Cal-Seal*
Hydro-Lok (PC-11)*
Diesel Oil Cement (DOC)*
Bentonite Diesel Oil

CEMENTS, ADDITIVES and CHEMICALS

HALLIBURTON WELL TREATMENT CHEMICALS

Acids — 8 basic solutions
Acid Inhibitors*
Non-Emulsifying Agents*
Mud Cleanout Agents*
Howco Hyflo and Morflo II*
Oil Base Mud Cleanout*
Gyp Removal Solution*
Scalechek*

* Halliburton developments or were original applications in field use by Halliburton.

Halliburton Products and Services are backed by more than 35 years of efficiently programmed research and development of new materials and techniques developed for field use by our own Chemical Laboratories — in conjunction with Halliburton Field Laboratories and field operating personnel.

Halliburton Services and Products hold the key to the solution of many well problems for the oil operators specific requirements. Whenever your well requires normal or specialized treatments — call Halliburton for servicing that you can rely and depend on.

Literature giving additional information is available upon request.

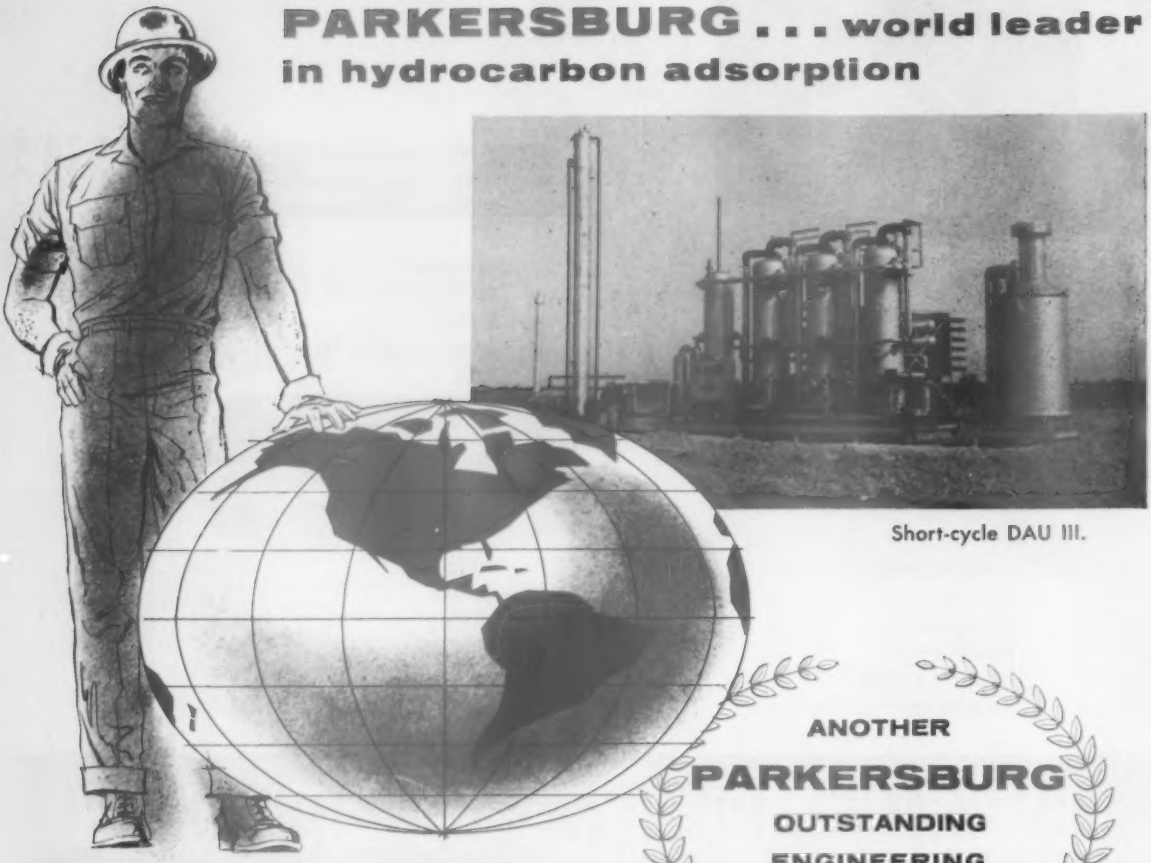
HALLIBURTON

OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

"THE OIL INDUSTRY'S MOST PROGRESSIVE SERVICE COMPANY"

PARKERSBURG . . . world leader in hydrocarbon adsorption



Short-cycle DAU III.

ANOTHER
PARKERSBURG
OUTSTANDING
ENGINEERING
ACHIEVEMENT

100 DAU's ON STREAM . . .

with PAYOUTS averaging 1.01 years!

Parkersburg, the pioneer in the field of short-cycle adsorption, has built over 80% of this type of equipment now in operation. Parkersburg's hydrocarbon-recovery units, the DAU II and III (dynamic adsorption units), are unsurpassed in their efficiency for extracting "stock tank" liquids from a gas stream, and recoveries as high as 95% of the natural gasoline and 30% of the LPG available in a gas stream can be adsorbed with the Parkersburg short-cycle unit.

No matter what your problem, there's a Parkersburg DAU to meet it efficiently and economically.

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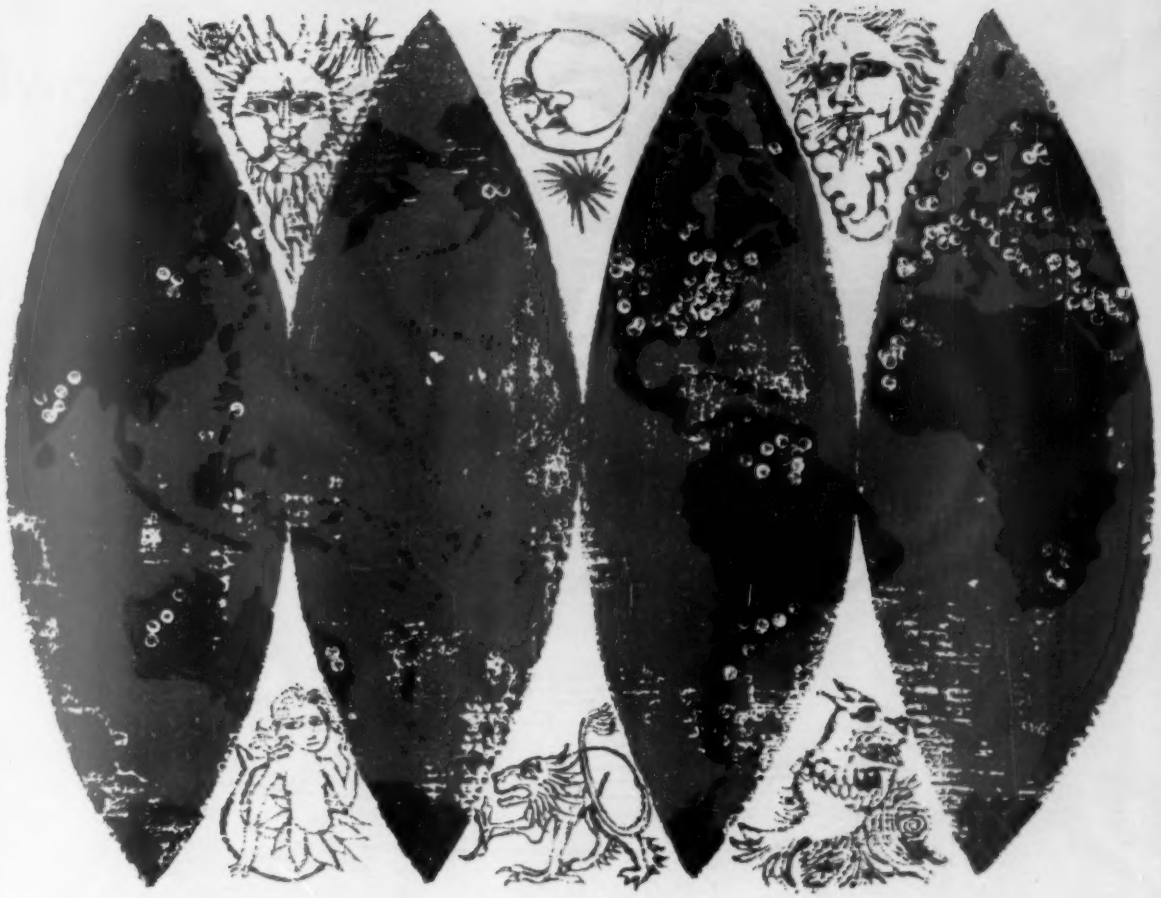

805 reasons a Foster Wheeler plant fits your requirements best

Wouldn't you like to find your new plant running on its scheduled completion date, meeting all specifications, and at a cost within the construction budget? The process industries have come to expect results like these when dealing with Foster Wheeler.

Would you like to see your own process plants handled by designers, engineers and construction men who have successfully put 75 different processes into efficient commercial operation?

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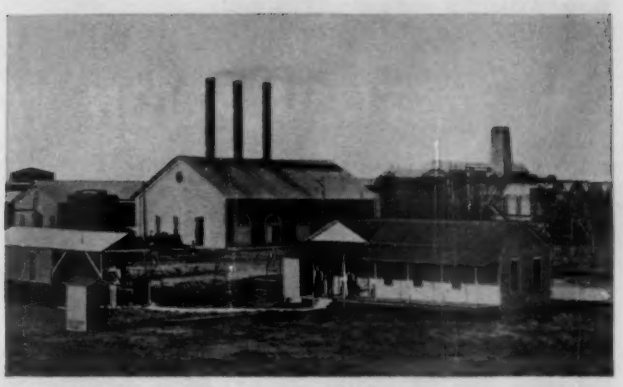
Two views of progress... 57 years apart

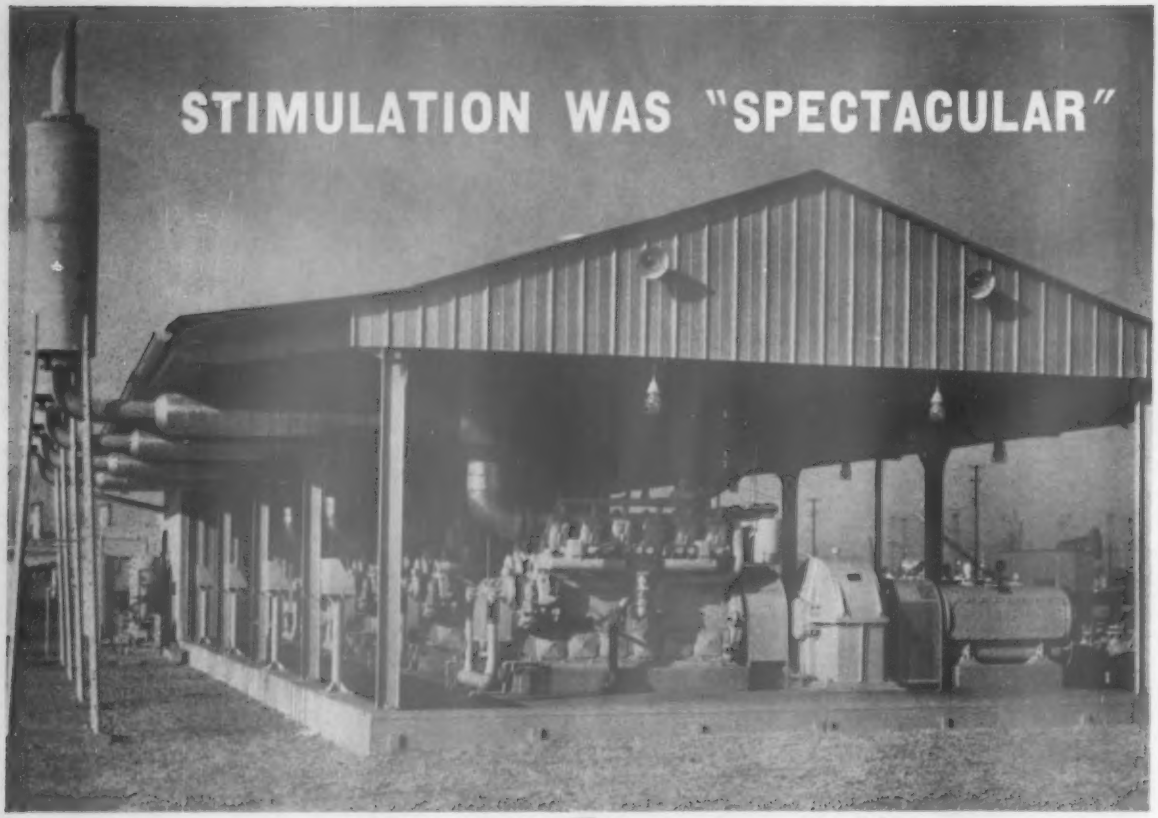


YESTERDAY. Texaco's first refinery at Port Arthur came into being in 1902 to turn the black crude oil — newly discovered in quantity — into useful products for mankind. Produced in simple stills, the first products were kerosine, naphtha, asphalt and primitive lubricants.

TODAY. At Port Arthur, and at 11 other major Texaco refineries in the United States, ultra-modern chemical wizardry uses many methods to produce constantly improved gasolines, perfected lubricants, and a myriad of other petroleum products. Because these products are so vastly improved, you can drive a more powerful car — jet planes can fly faster and farther — industry can operate more efficiently. And because it has constantly planned ahead, Texaco's growth has been continuous.

TEXACO

... CONSTANT PROGRESS IN OIL'S FIRST CENTURY



waterflooding at Long Beach with WAUKESHAS

The waterflood repressuring project—under Long Beach City property, in the Wilmington California Oil Field—is probably the country's largest. The Waukesha-Engine-powered Pier E station is the project's second water injection plant. Ten months after its activation, stimulation observed was "spectacular" as one expert put it.

Four Waukesha V-12 natural gas engines drive four Oilwell 558-P Quintuplex Plunger Pumps. Each pump delivers a volume of 20,400 bpd of salt water at a pressure of 1270 psi—at 175 rpm max., with 5-in. diam. plungers. The pumps can operate at 2000 psi, with 4-in. plungers, and deliver 11,150 bpd.

The four Waukeshas are Model VLROB natural gas engines, 12-cylinder, 8½ x 8½-inch bore and stroke, 5788 cu. in. displ. Engines are set to max. full load speed of 1020 rpm to give approx. pump speed of 175 rpm driving through speed reducers with 5.857:1 ratio.

These Waukesha Engines are equipped with S-69 Western Gear speed reducers; Ross 1204-CP Heat Exchangers; couplings—engine to reduction gears, 28-CB-525 Fawick—gears to pump, Fasts No. 6.

Send for Waukesha Bulletin 1656.

450

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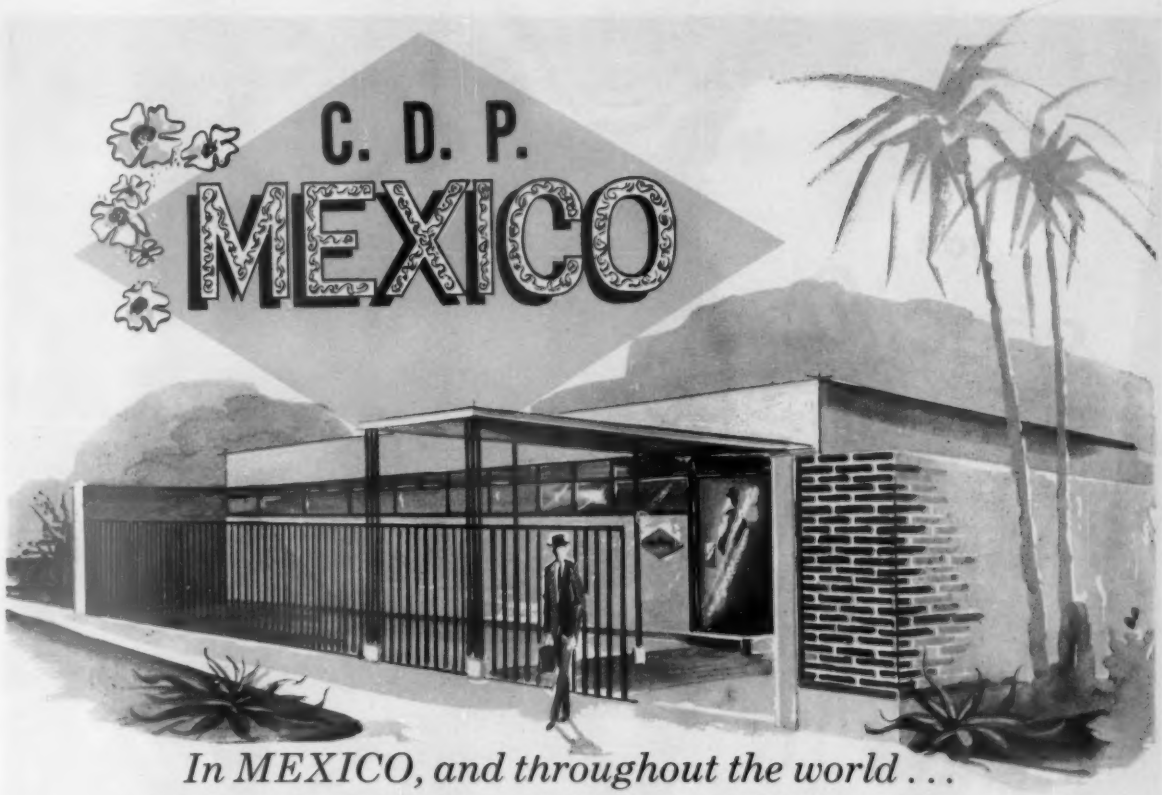

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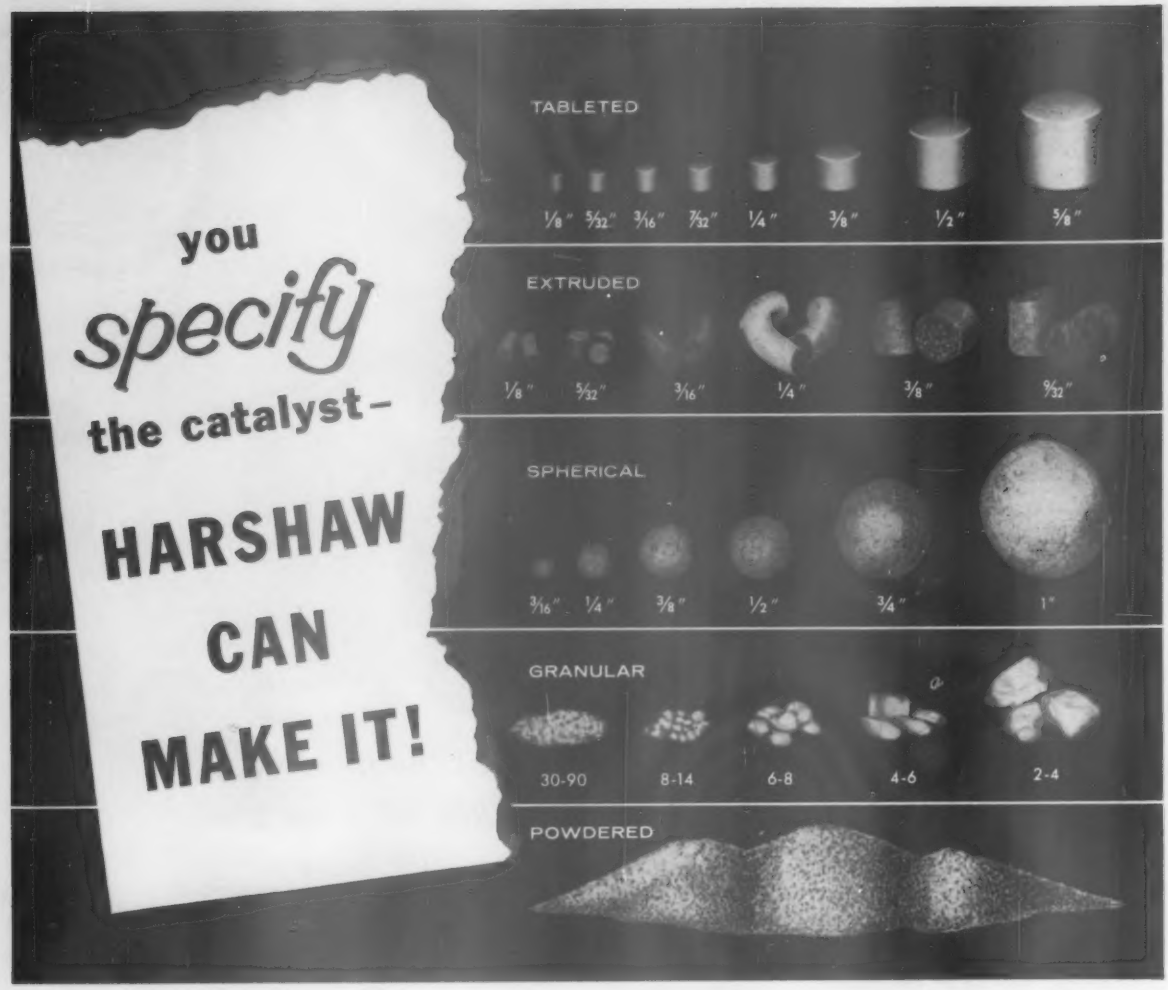

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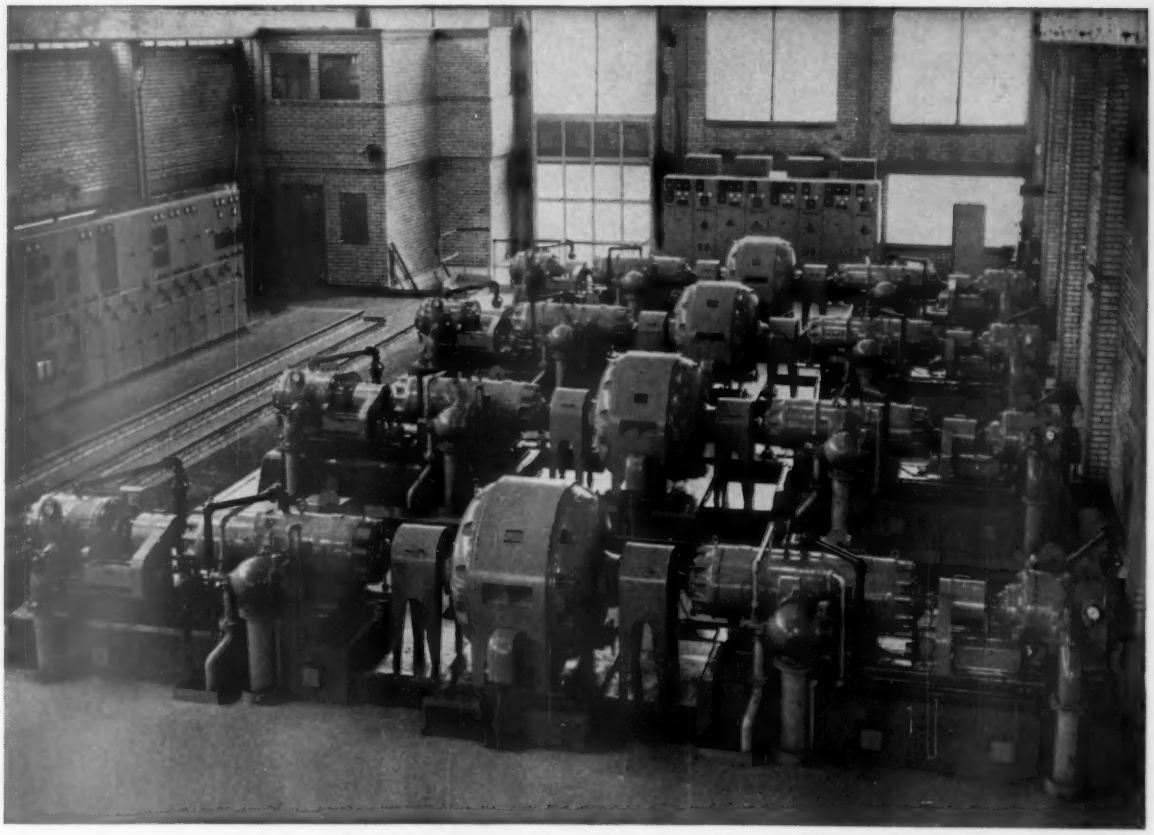

Eight 1664 cfm Fuller rotary units compressing to 120 psig in tandem sets to four 700 hp electric motors. Compressor plant supplies 13,200 cfm load to oil refinery—for tools, machinery, air lines and other pneumatic uses.

HOW FULLER ROTARY COMPRESSORS SAVE SPACE – CUT OPERATING COSTS,... at major eastern refinery

To save valuable space in the compressor plant, a large eastern oil refinery installed eight two-stage Fuller rotary air compressors—using a unique drive system. Because of the simple direct-drive through flexible couplings permissible with Fuller rotaries, the refinery was able to drive dual sets of compressors by single, 700 hp. electric motors.

While this means savings in space, the rotaries are also operating with cost-cutting efficiency.

In more than two years of service, these rugged compressors have required no down-time for repairs!

Simple design, rugged construction and precision manufacture are the "secrets" of Fuller rotaries' dependability. The only moving parts are rotor, blades and bearings. There is no reciprocating action—hence no vibration. Smooth, quiet operation permits installation on light-weight foundations, on upper floors—saving in weight, bulk and cost of installation.

For full details on the maintenance-free economy and high performance of Fuller rotaries, write today for comprehensive, illustrated Bulletin C-5A.

C-343
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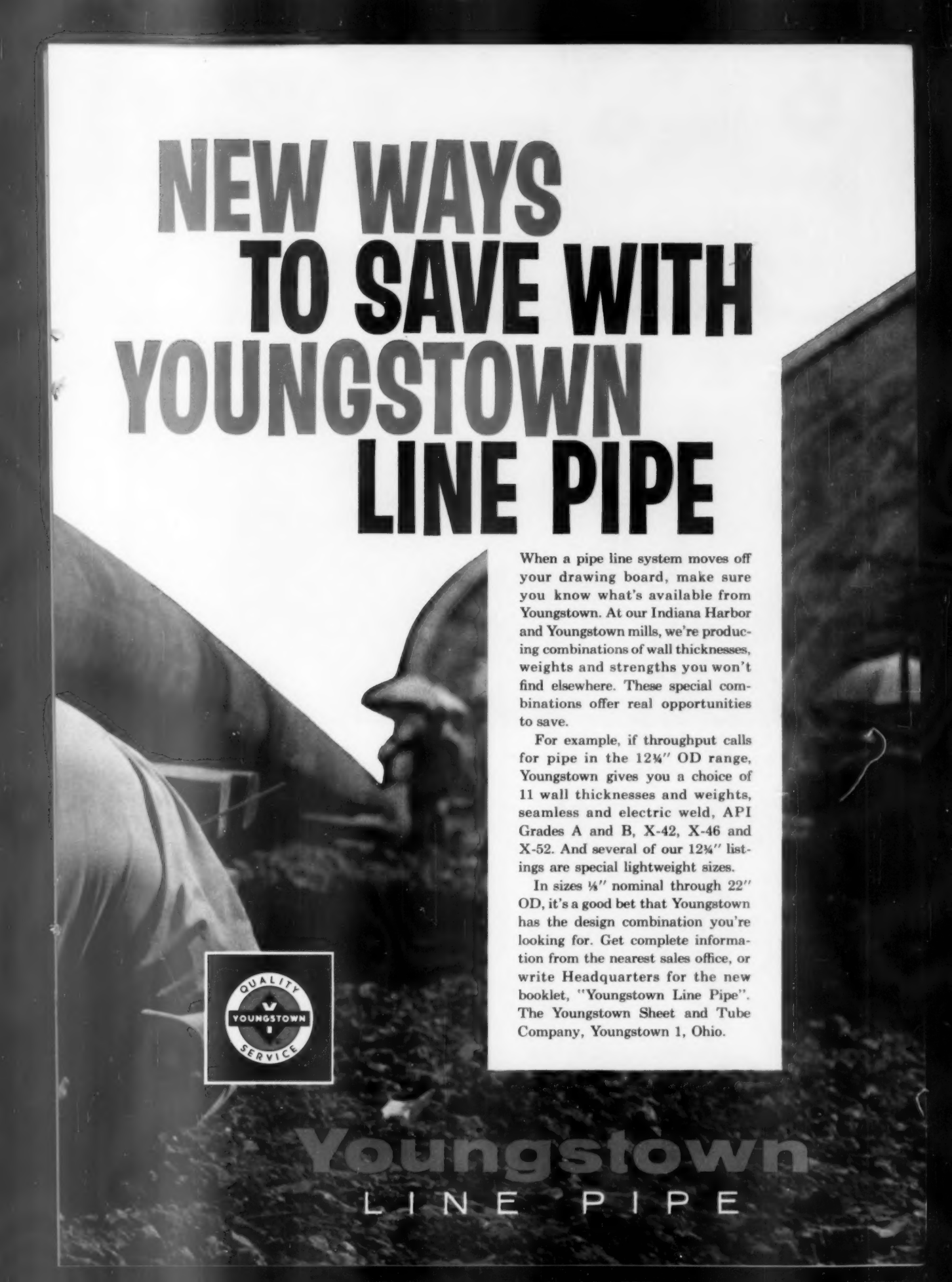
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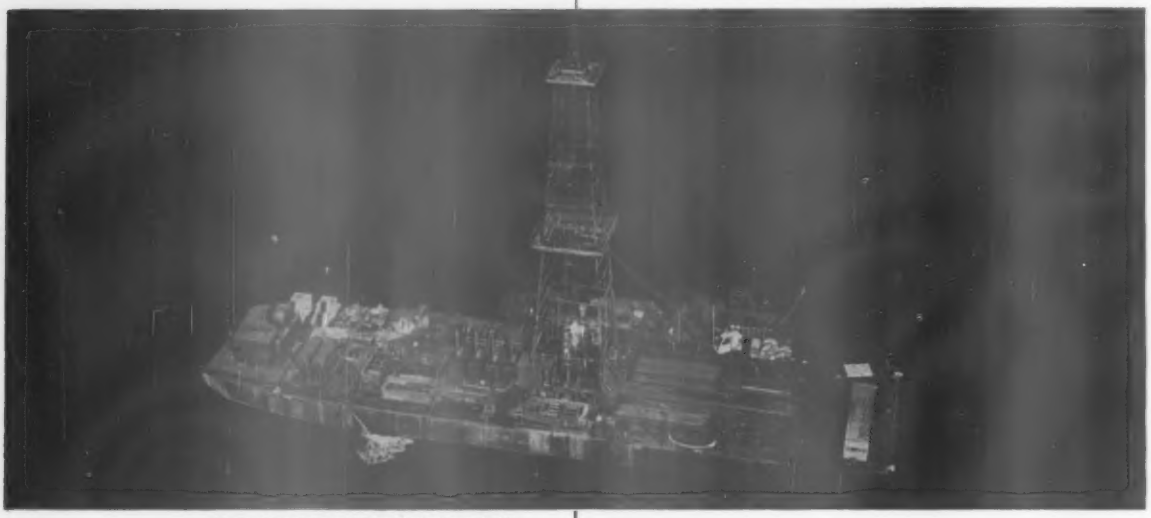
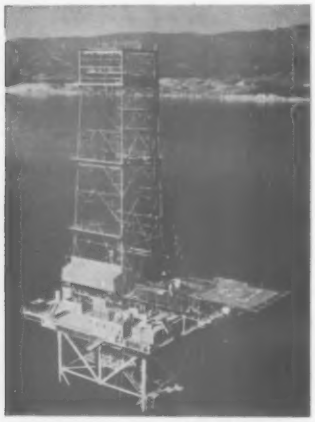
The parent company, Haney and Williams Drilling Co., is an organization with twenty-one years of competitive diversified experience in the California area and other parts of the Western Hemisphere.

Current operations consist of four modern rigs in California and seven projects in foreign and offshore locations.



WODECO FLOATING BARGE OFF THE CALIFORNIA COAST. OPERATOR—Phillips Petroleum Co. & Associates. BARGE—254 ft. x 68 ft. x 18 ft. steel. DERRICK—108 ft. steel designed to rack 10,000 ft., 3½ drill pipe in 60 ft. stands. DRILLING EQUIPMENT—one 12,000 ft. Diesel rig with a total of 2100 horsepower.



FIXED PLATFORM OFF THE CALIFORNIA COAST erected by Standard Oil Company of California and Humble Oil and Refining Co. PLATFORM—178 ft. platform permanently set in 100 ft. of water, 2.2 miles off the coast in open ocean (plus 147 ft. derrick). PROVISION for completion of 25 wells. DRILLING EQUIPMENT—two completely independent 12,000 ft. rigs powered by electric current from the shore.

FOREIGN OPERATIONS

The Haney and Williams organization has operated outside the Continental United States since 1950 in Mexico, Uruguay, Brazil, and Alaska. It is in a position to furnish crews, equipment and experienced supervisory personnel for drilling operations anywhere.

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OFFSHORE OPERATIONS

WESTERN OFFSHORE DRILLING AND EXPLORATION CO.

WODECO is an organization specializing in adaptations to marine drilling requirements on the Pacific Coast since 1956.

HANEY AND WILLIAMS DRILLING CO.

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Typical engine-generator set in use by Dixilyn Drilling Corp. on the "Julie Ann." Superior 8-cylinder diesel drives 500 KW generator and fluid coupling to provide both electrical and mechanical power.

new rig power with four-way flexibility ...White's DRILLECTRIC*

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Drillectric—all-electric or electro-mechanical systems—now offers the broadest possible range of power units for oil well drilling. An extensive line of Superior engines, completely packaged with generators, motors and other components permits up to 263 combinations.

CHOICE OF DIESEL, DUAL-FUEL OR GAS

Choose from 5 diesel and dual-fuel engines, or 2 gas engines. Engine-generators can be specified in groups of 2 to 4 in "building block" fashion, so you can customize your rig. You can interchange groups of gas or diesel engines or swing from gas to diesel power in dual-fuel models.

ALL-ELECTRIC OR ELECTRO-MECHANICAL SYSTEMS

All-electric systems use electric motors for all power driven equipment. Electro-mechanical systems use electric motors for draw-works and rotary table and compounded mechanical power between engines and mud pumps. The number of electrical components is reduced to a minimum commensurate with practicability and safety.

FREEDOM OF POWER LOCATION ON RIG

In either system, group composed of engines, generators, motors or chain compound, and pumps can be located without regard to draw-works power. For a barge rig, this package can be housed in an engine room. For land rigs, it is not necessary to construct an expensive elevated substructure, nor to place the power group close to the derrick floor. This complete freedom of location promotes better arrangement of machinery and lowers cost.

Get new *Drillectric* Bulletin 123 from leading rig manufacturers, White oil field representatives, or through White Diesel Engine Division.

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THE WHITE MOTOR COMPANY
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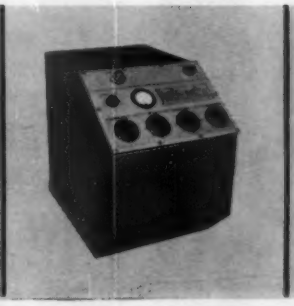

Left, 500 HP motor for draw-works, rotary table or mud pumps. 1000 HP motors also available.

Center, small electrical panel easily fits ordinary drillers console.

Right, skid-mounted electrical control cabinet.

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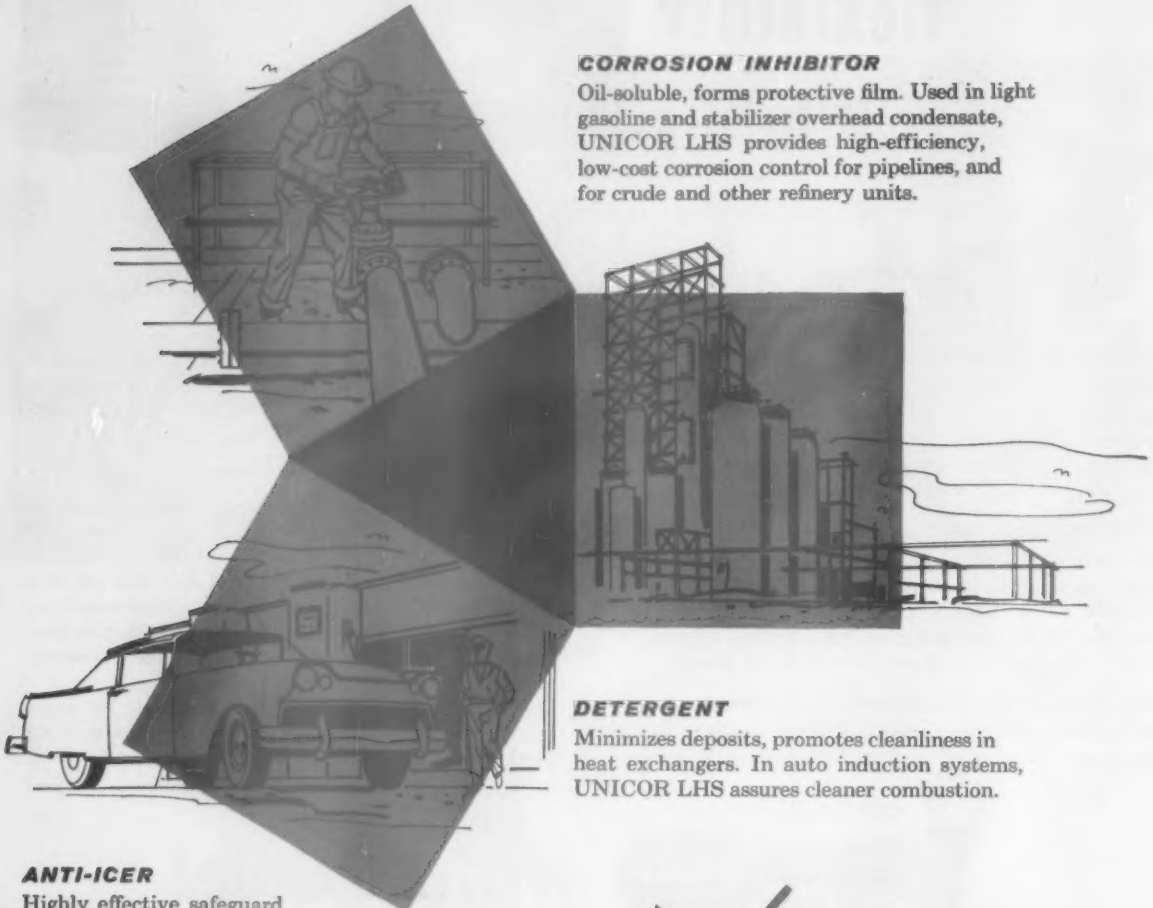

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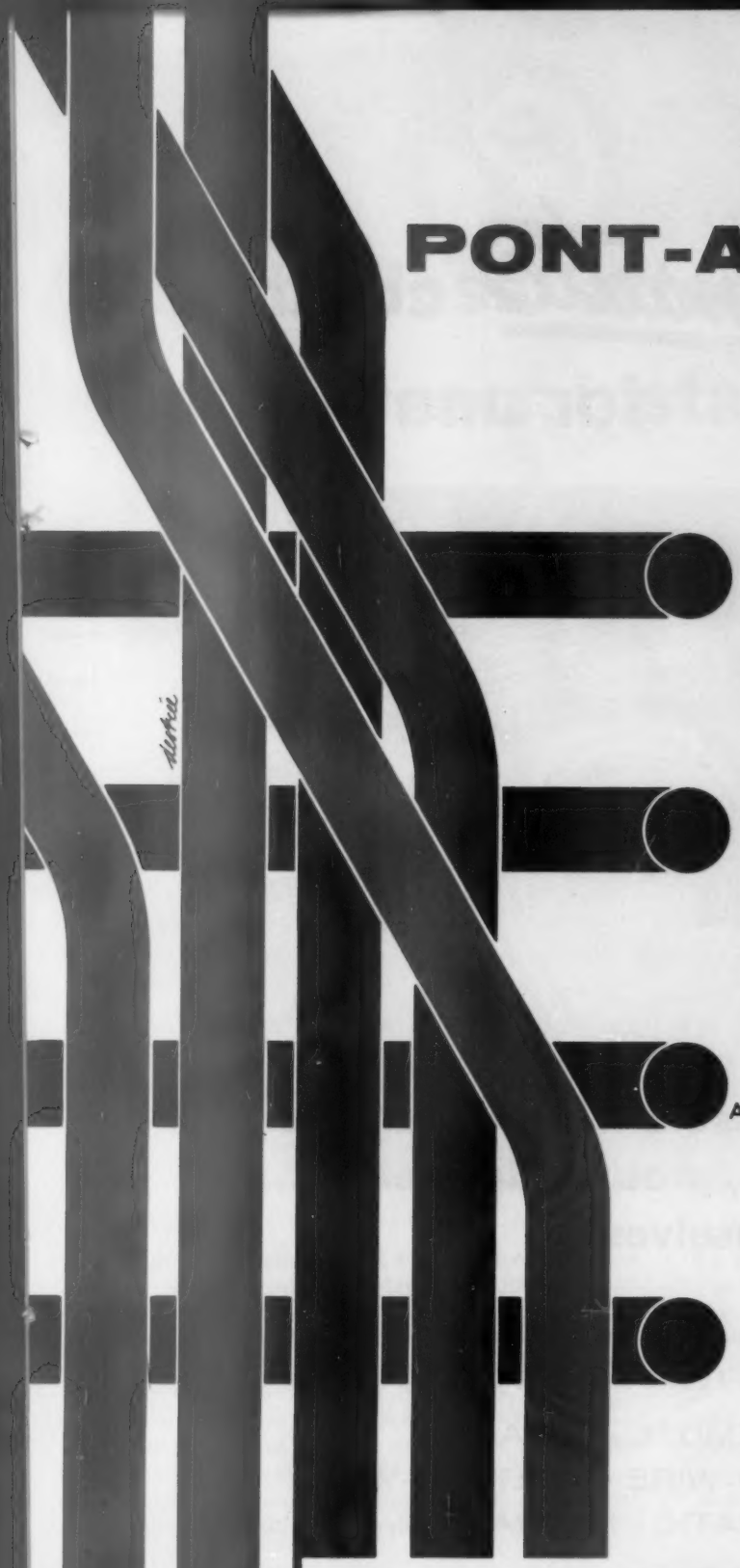

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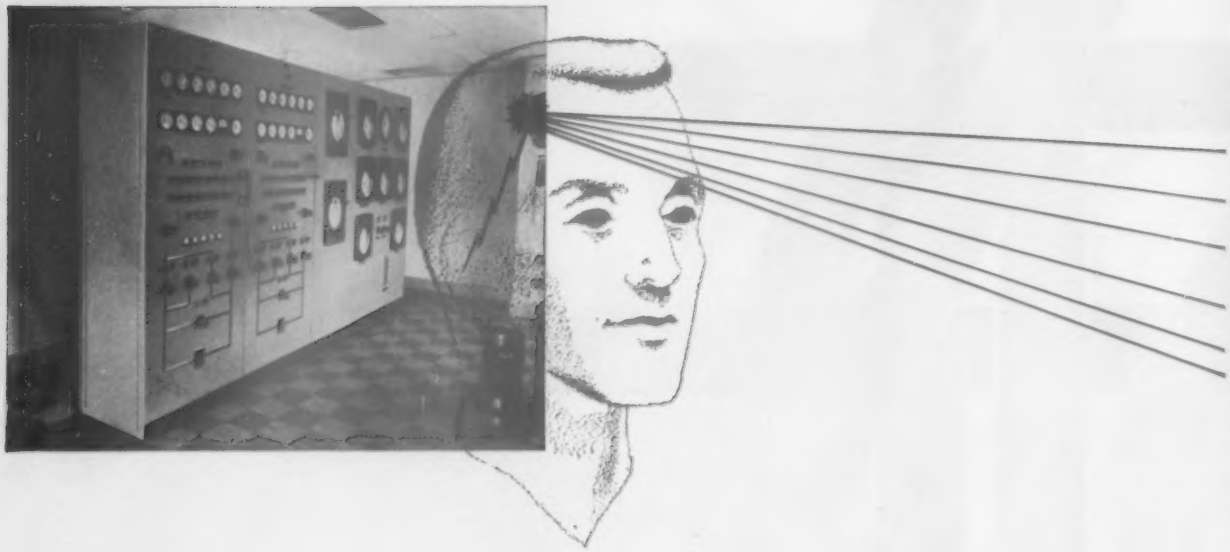
Tendamatic® control... for unattended



engine-compressors with Tendamatic control operate themselves, protect themselves... truly, think for themselves!

Tendamatic control is available only for Ingersoll-Rand compressors... for any requirements, any service.

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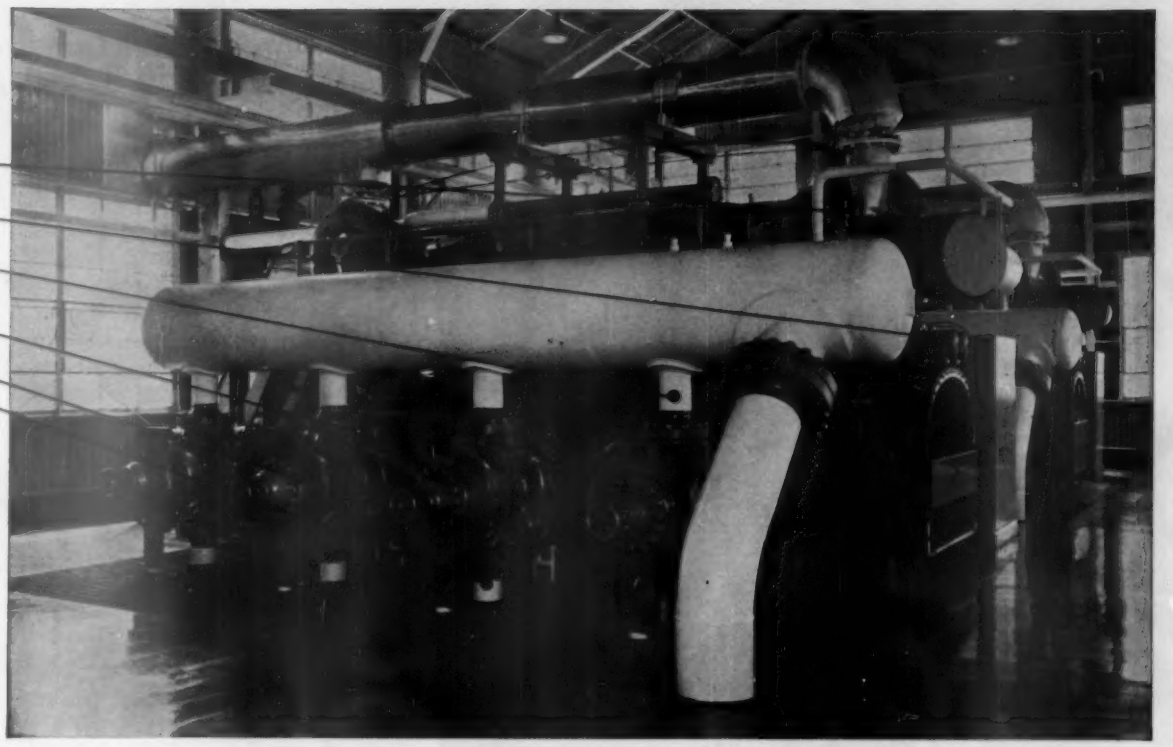

With an Ingersoll-Rand Tendamatic control system, all phases of compressor startup, regulation, supervision and protection may now be executed automatically or by remote control. Thus the compressor plant is made independent and self-sustaining, and may be left to "think for itself".

On engine startup, all operations are performed in proper sequence and the unit is put on the line. During operation, engine and compressor are completely, *automatically* protected against any abnormal condition. On shutdown too, all operations are performed in sequence. In case of trouble, Tendamatic control gives warning, indicates the source, and if necessary, shuts down the unit.

These automatic control systems are the product of Ingersoll-Rand's Tendamatic Control Division—a specialized group of engineers and experienced production men whose job is the development, design, manufacture and application of control systems for all types of compressor installations. For more information, call your I-R representative or write for Form 3276.

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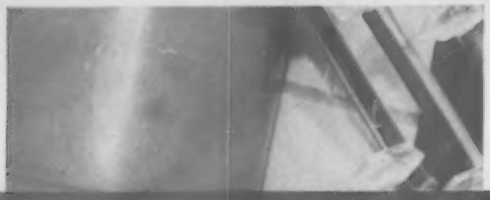

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Another Well Done with Magcobar Technology

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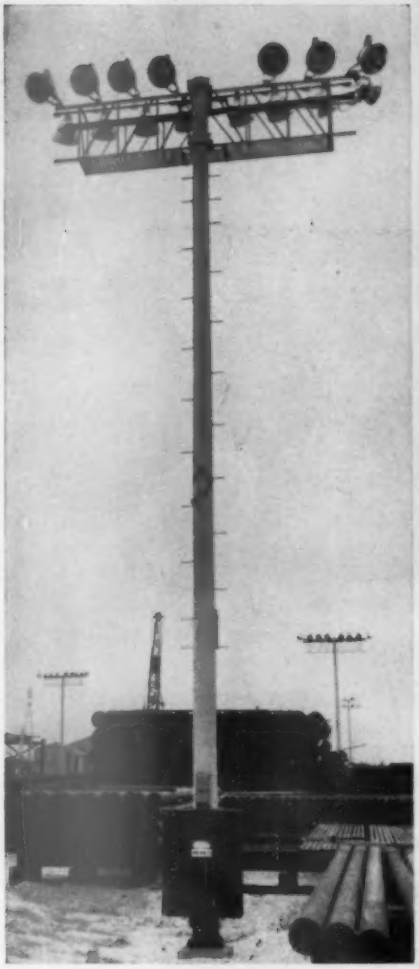
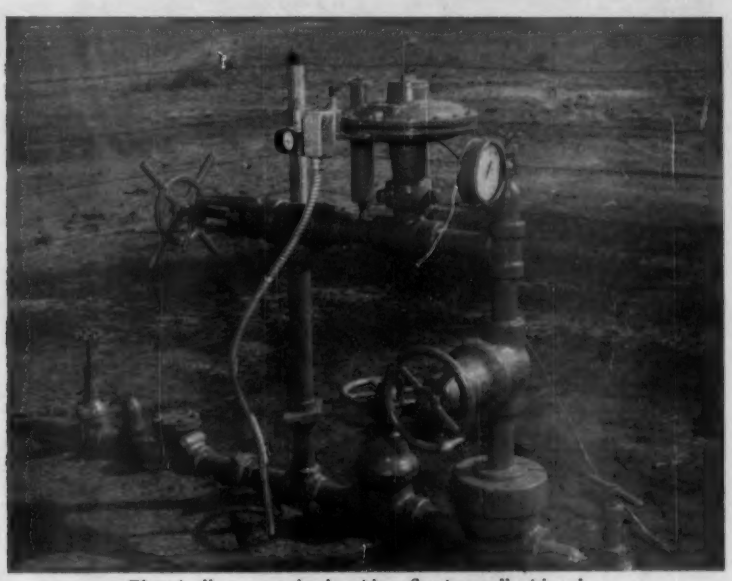
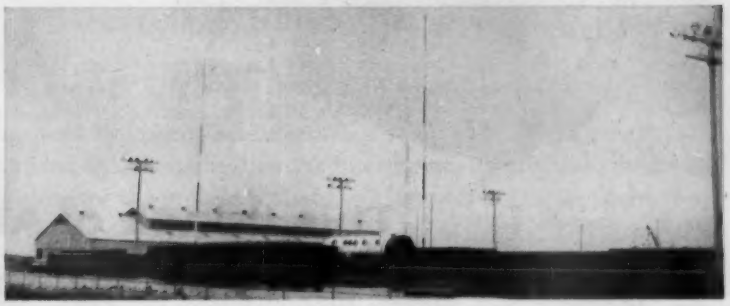
You can depend on purchased electric power for

AUXILIARIES





Electrically operated solenoid on flowing well with valve controlled by electric time-clock.



Lighting for oil company pipe storage yards and rail unloading areas.

Typical of thousands of auxiliary applications of purchased electric power... the photographs above indicate the varied use of electricity in the petroleum industry. The dependability and economy of utility electric power is fast proving the answer to many problems in oil producing, transporting and refining. Contact your nearest utility electric power company for full cooperation.

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saves money, manpower, maintenance, and serves you better automatically

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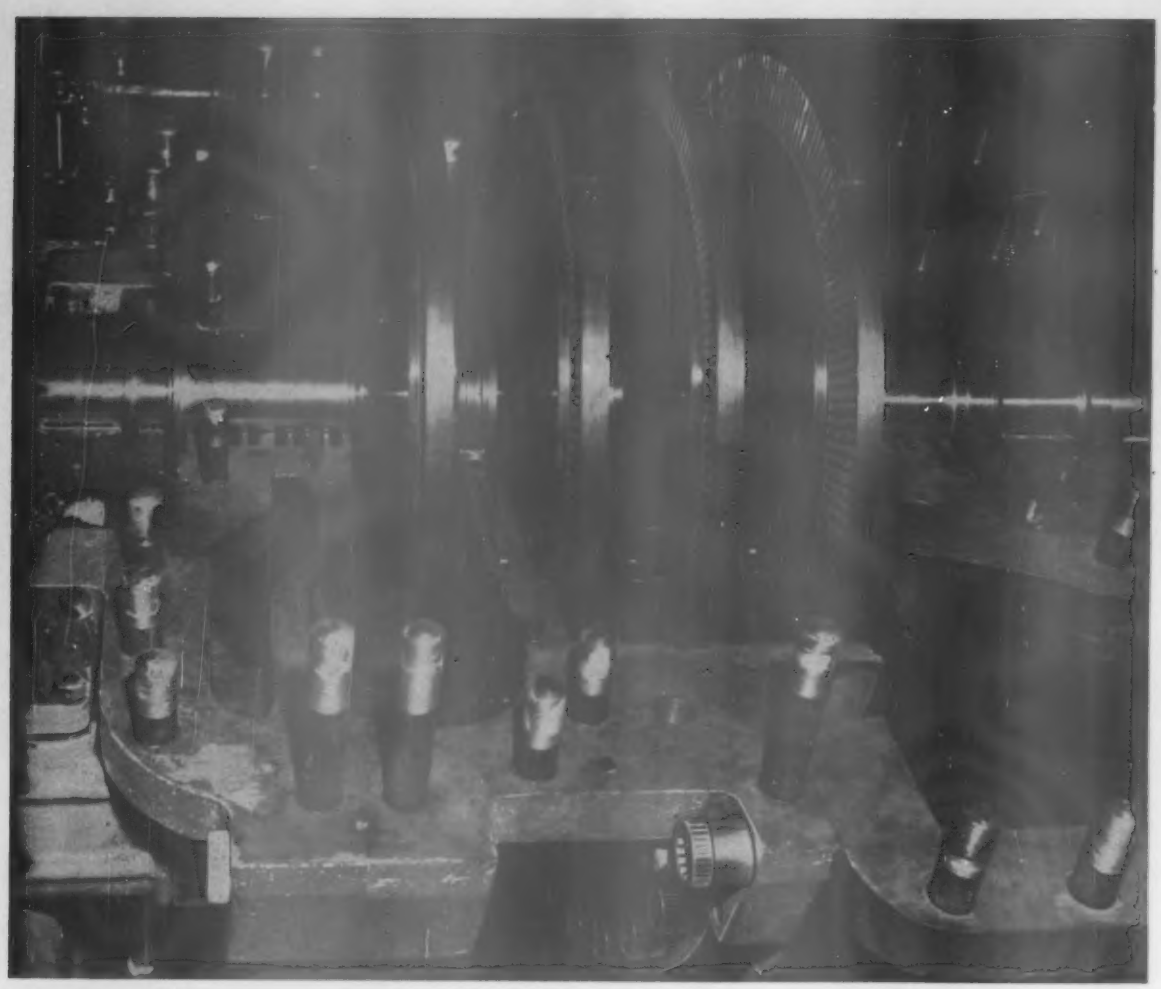

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A look at MURRAY'S rugged construction from the inside shows the husky shaft and heavy accurately formed discs with generous sized hubs designed to withstand the axial and radial stresses imposed by this type of service.

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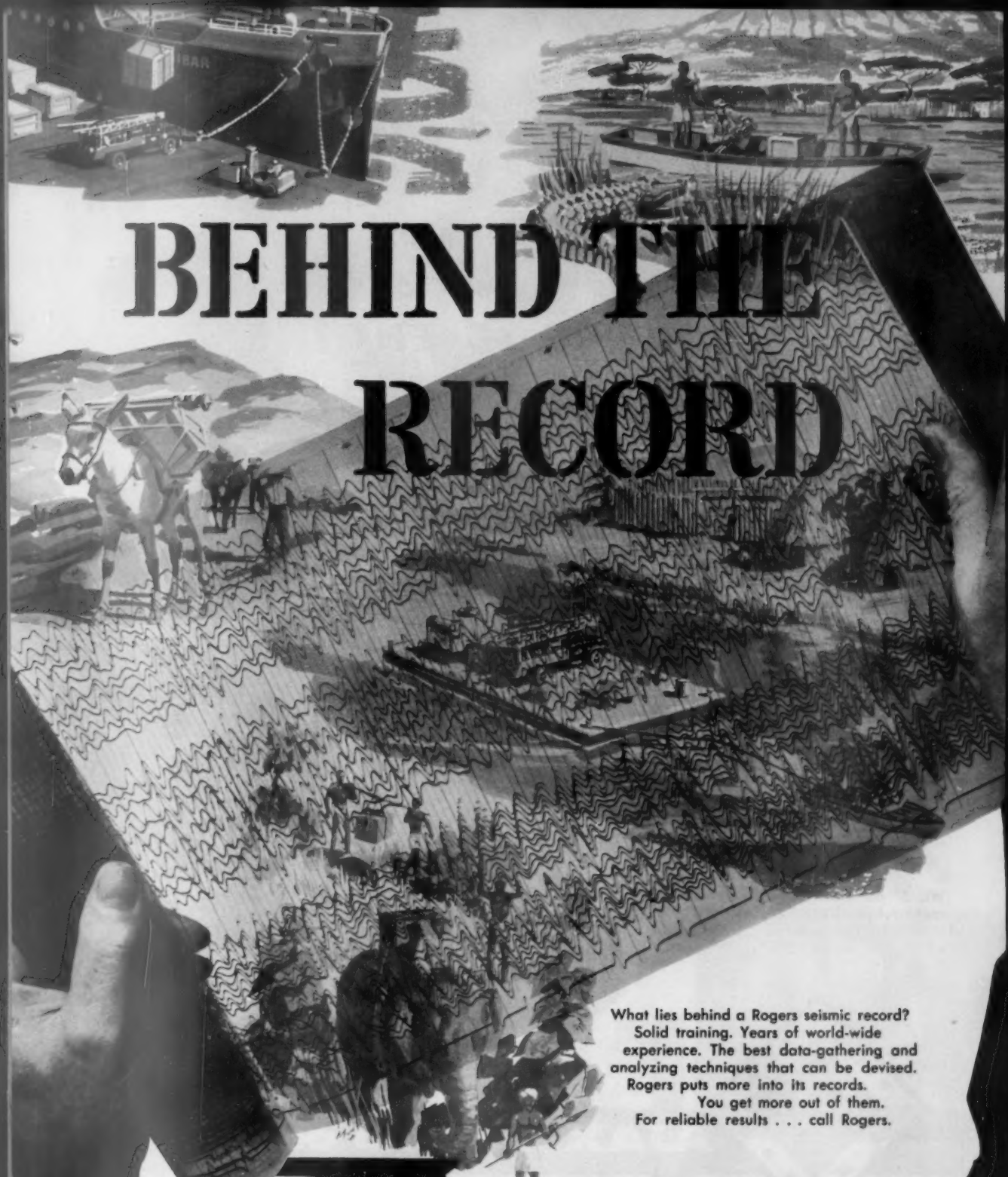

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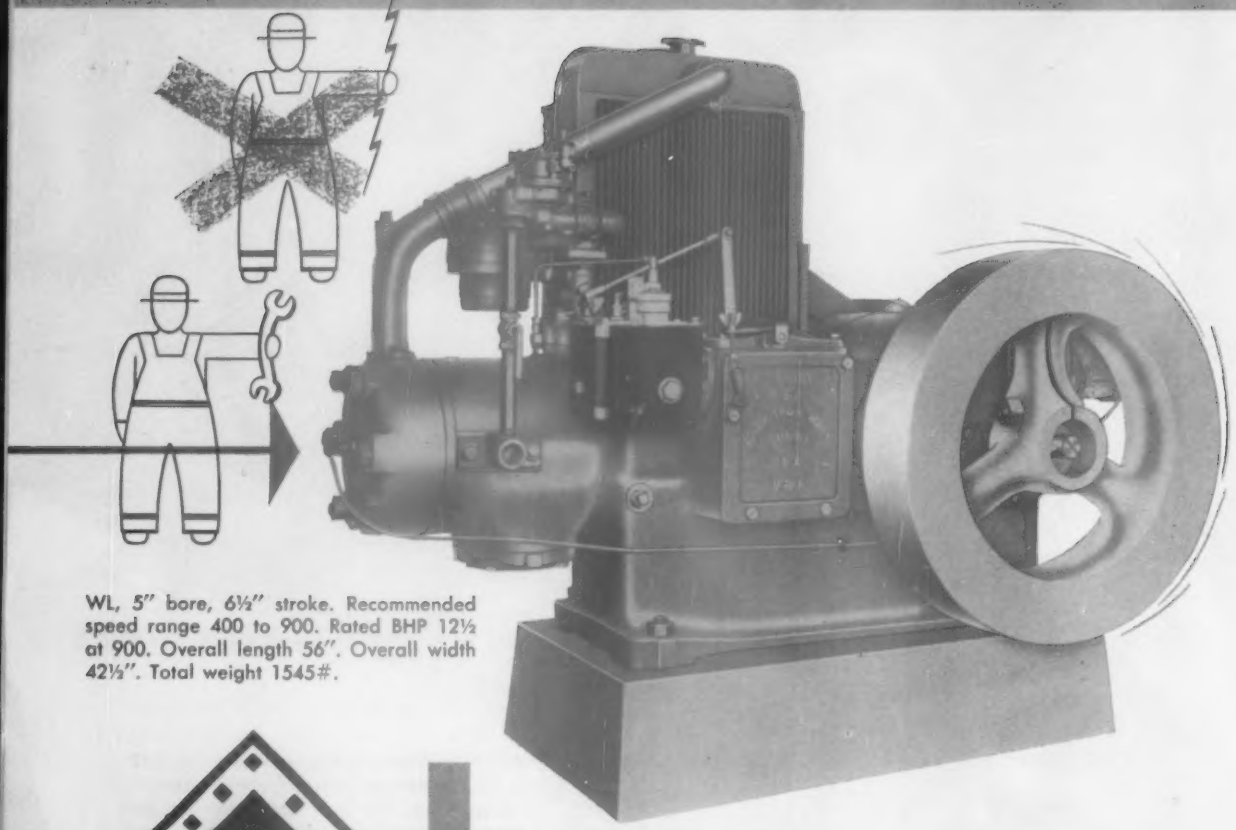

WL, 5" bore, 6½" stroke. Recommended speed range 400 to 900. Rated BHP 12½ at 900. Overall length 56". Overall width 42½". Total weight 1545#.

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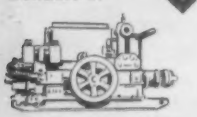

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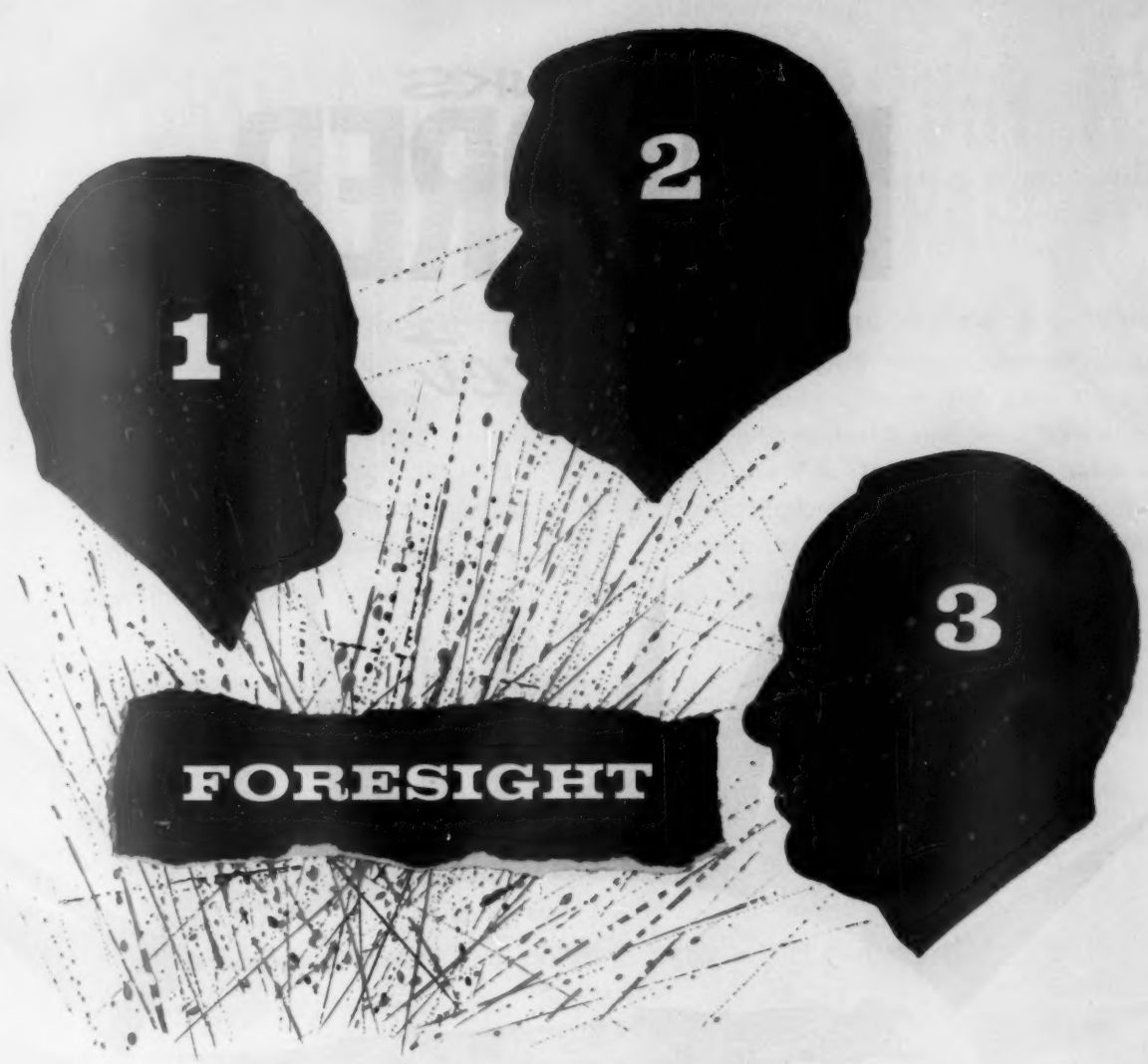

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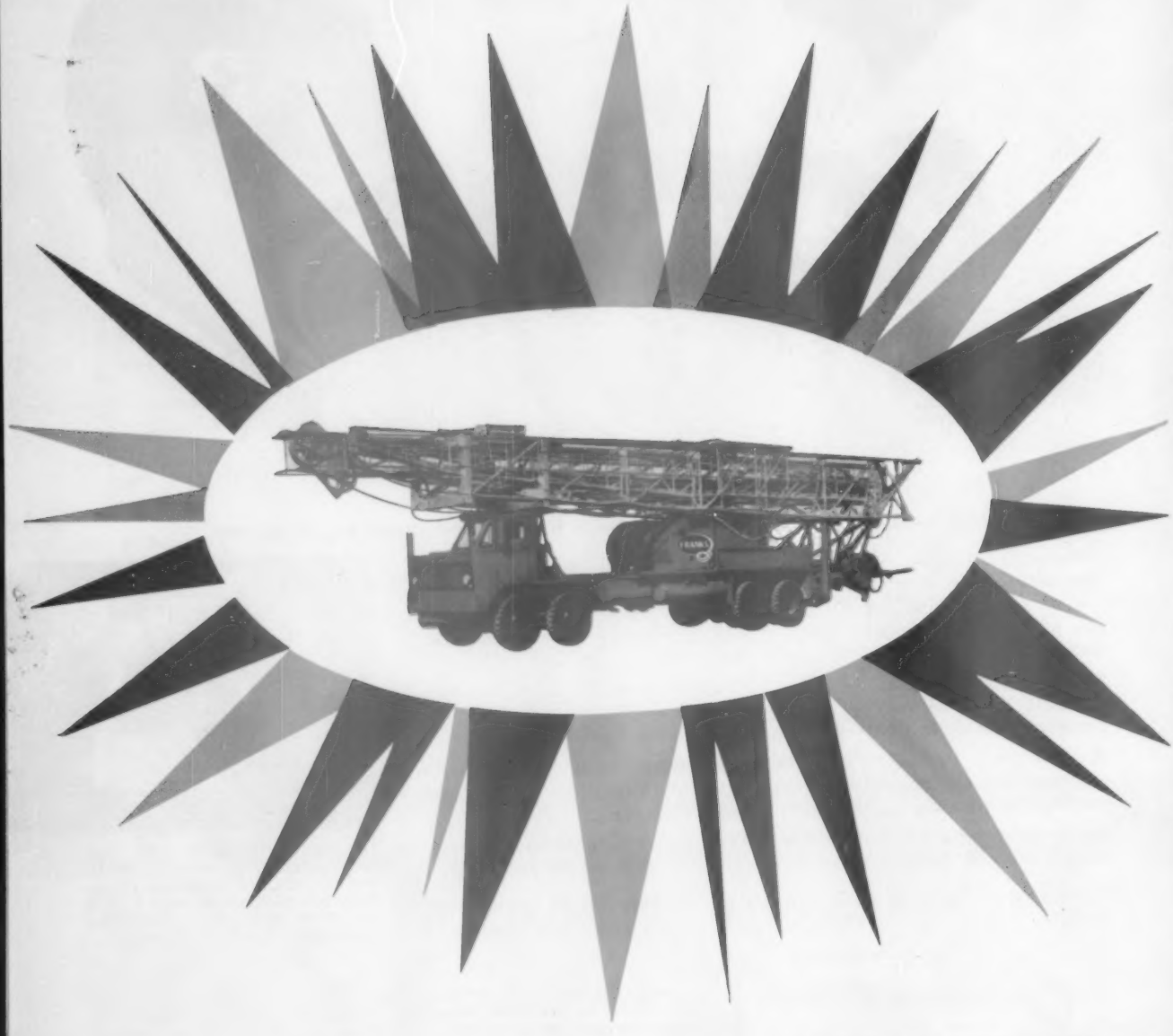

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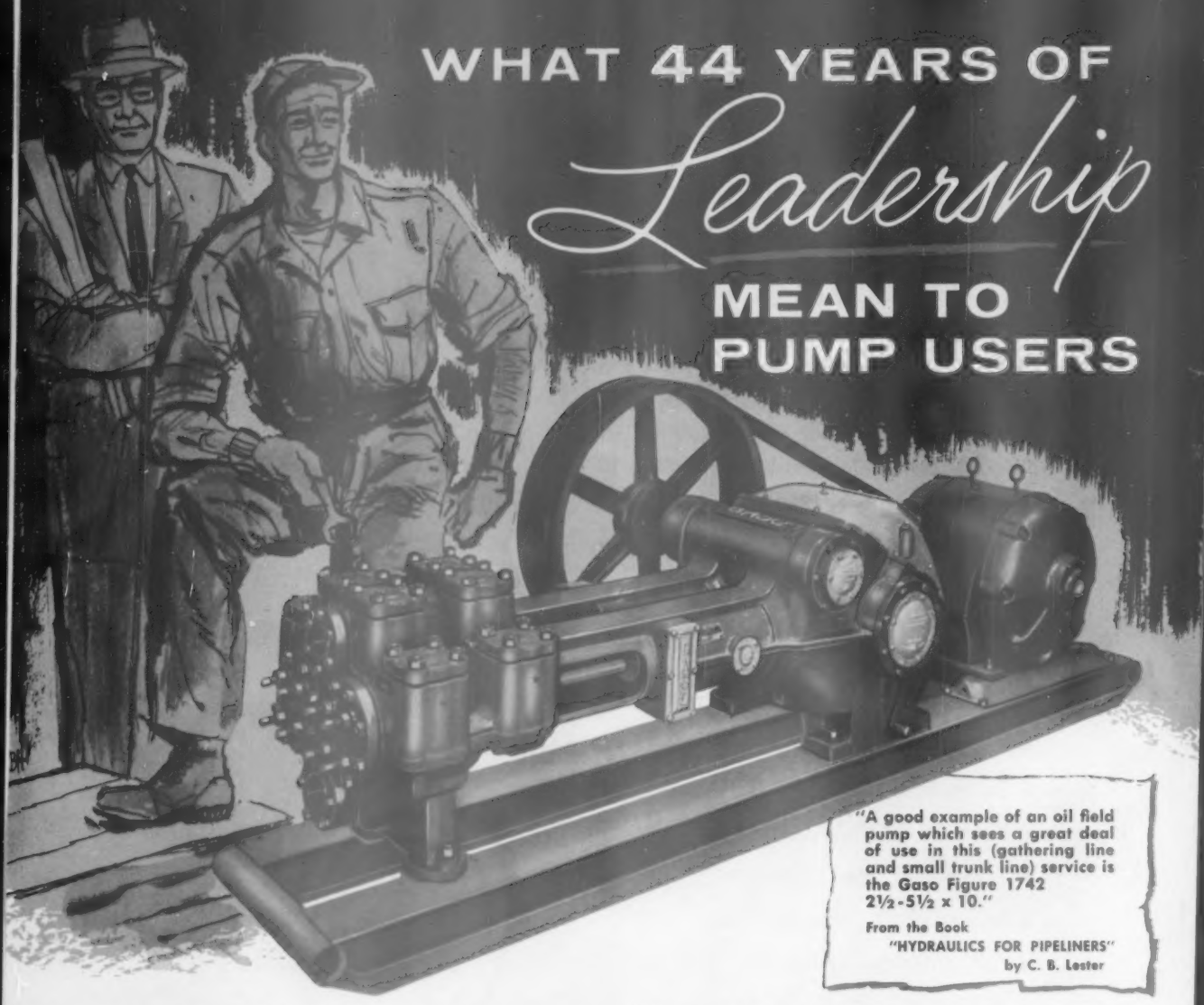

"A good example of an oil field pump which sees a great deal of use in this (gathering line and small trunk line) service is the Gaso Figure 1742 2½-5½ x 10."

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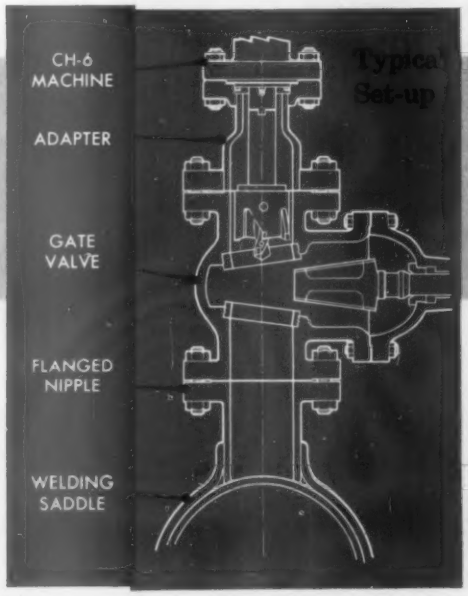

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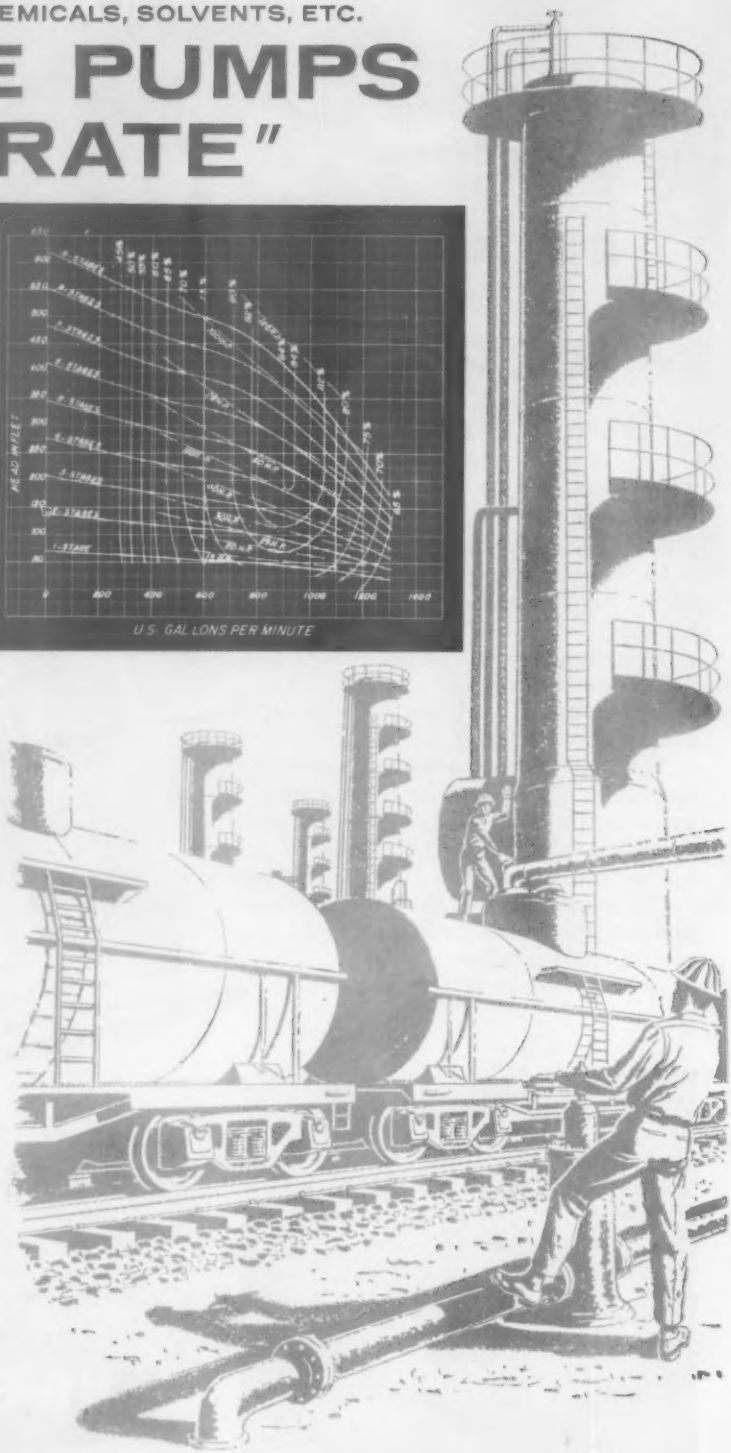
Figure 4703: Designed especially for pumping gasoline and oil from underground tanks. Capacities from 15 to 75 G.P.M. for pressures up to 100 lbs.

Figure 4700-G: For fueling systems and testing station service these pumps are usually mounted directly on steel or lined concrete storage tanks below ground. Complete range of sizes.



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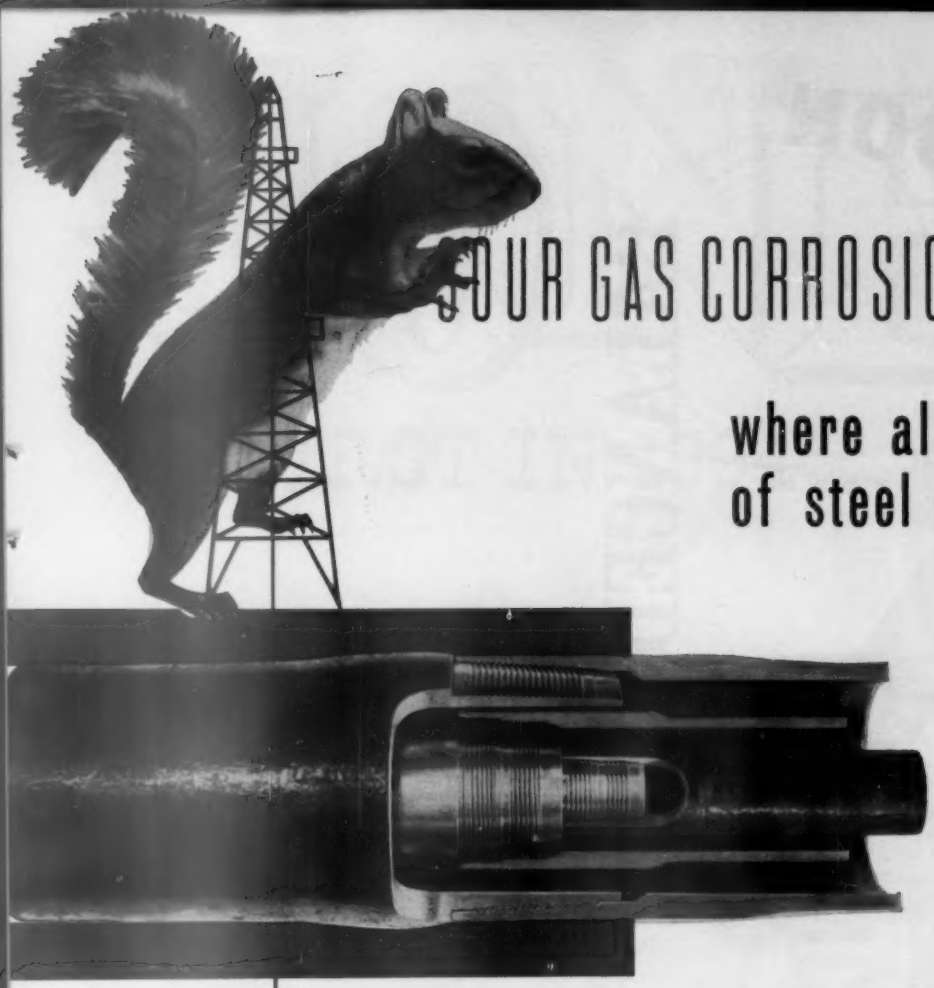

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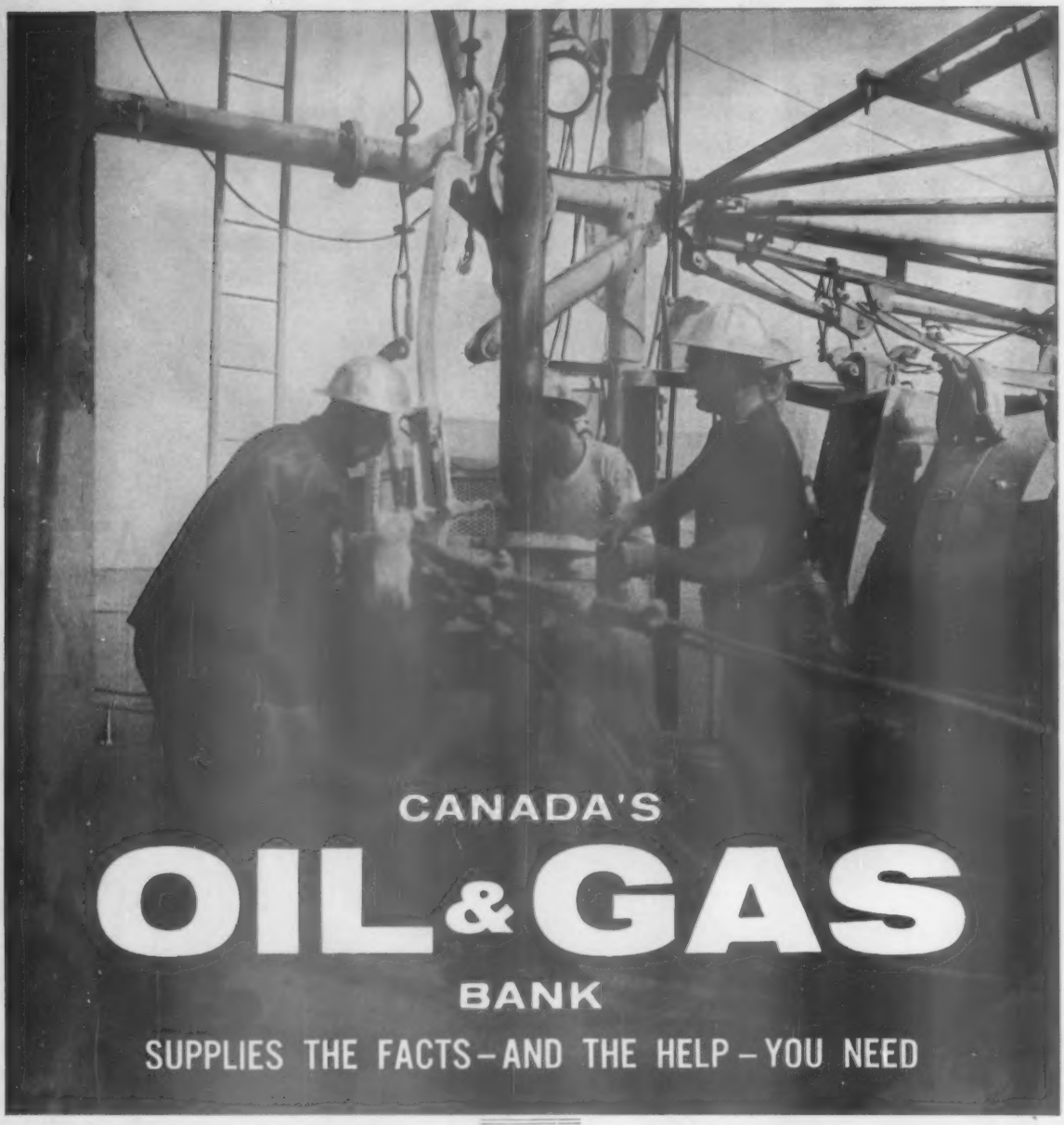

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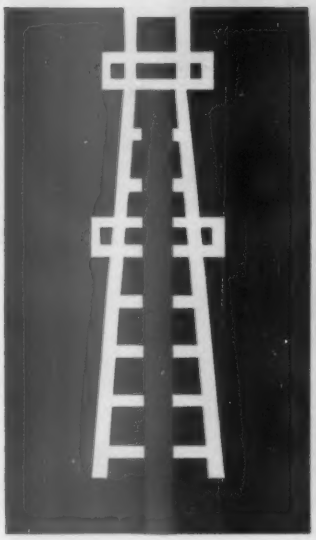

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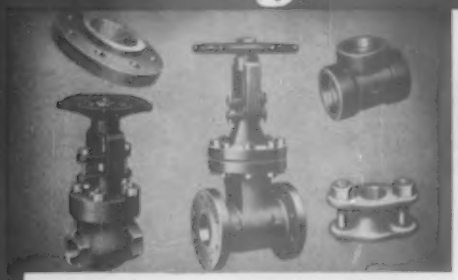

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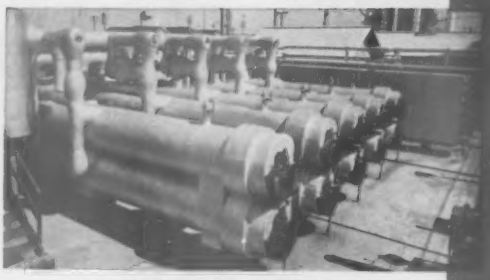

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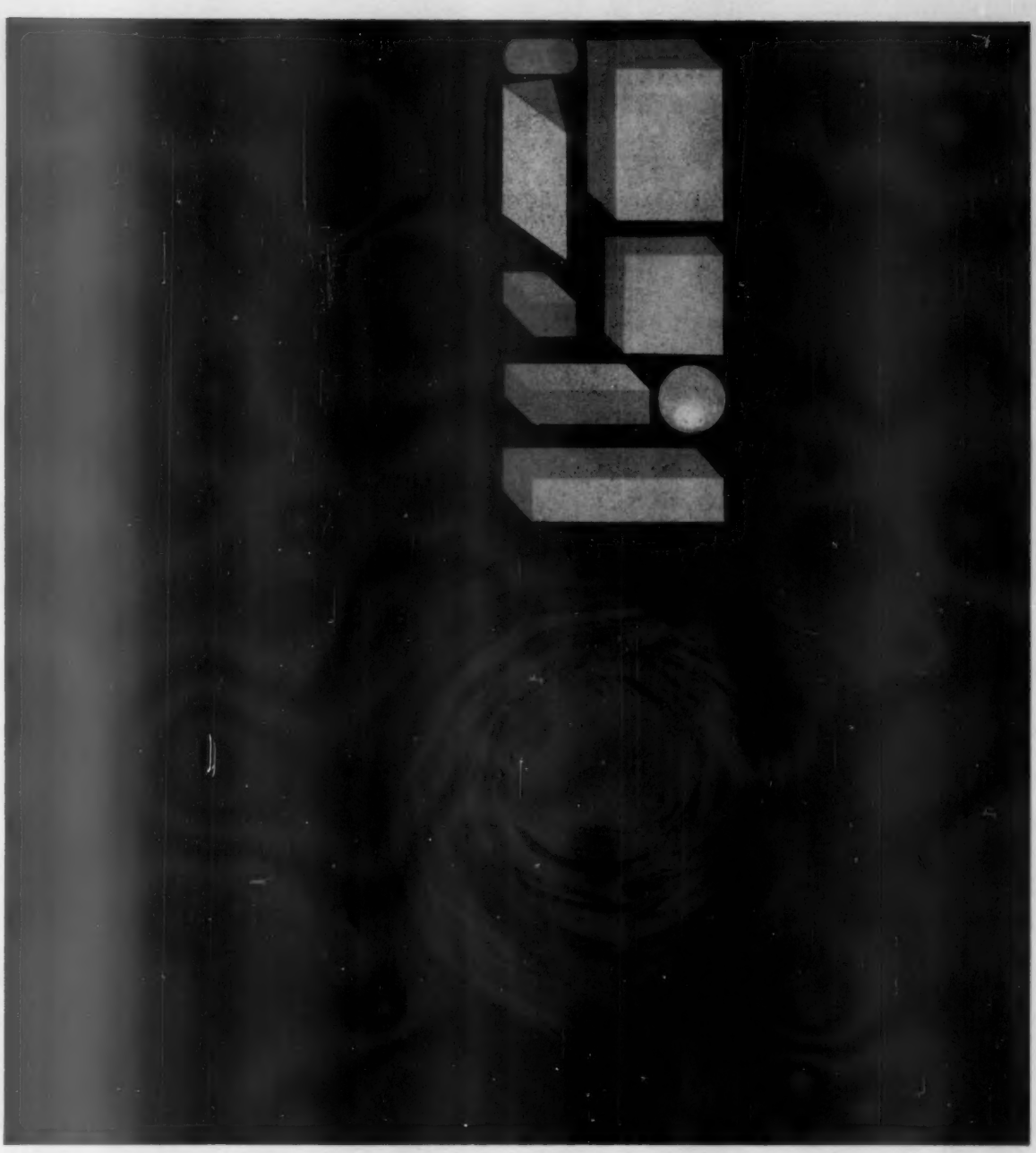

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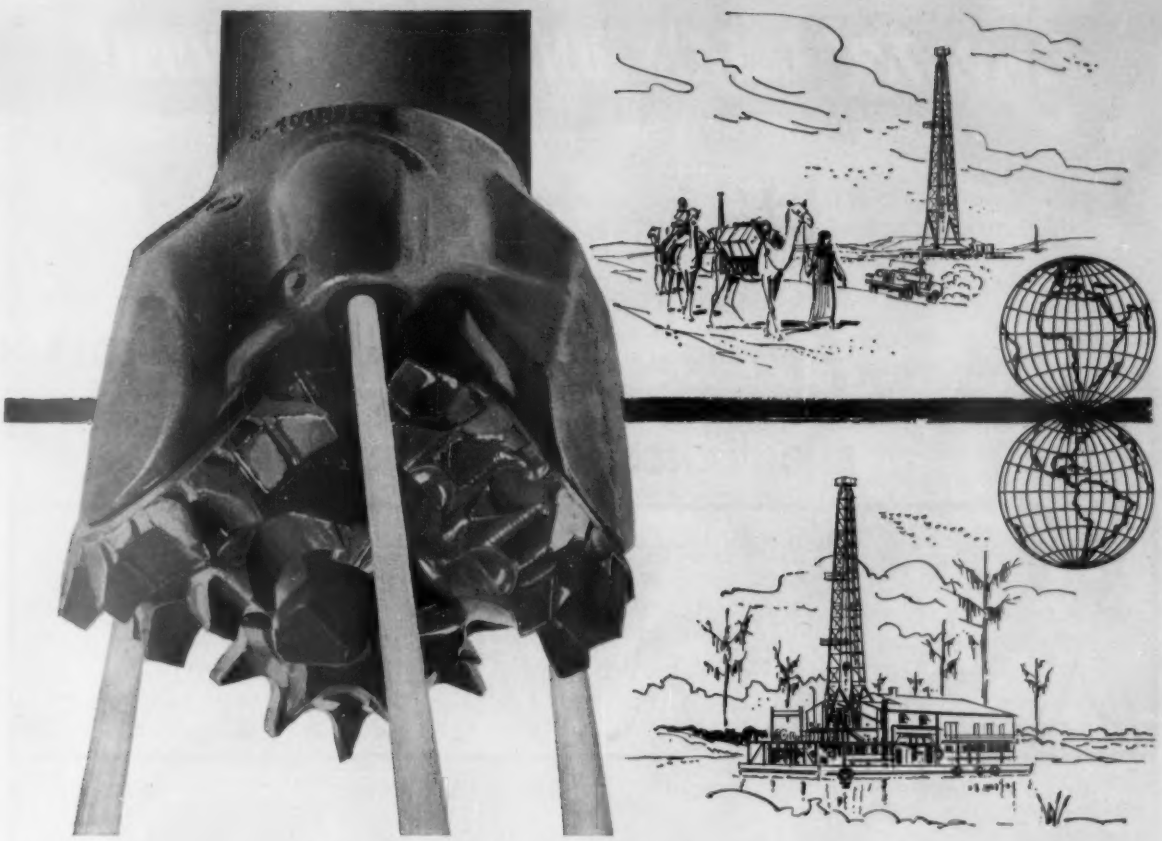

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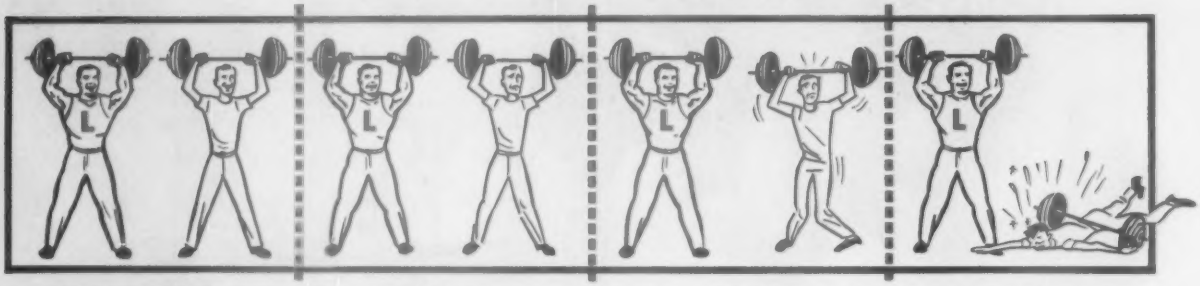

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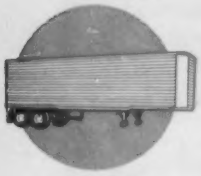

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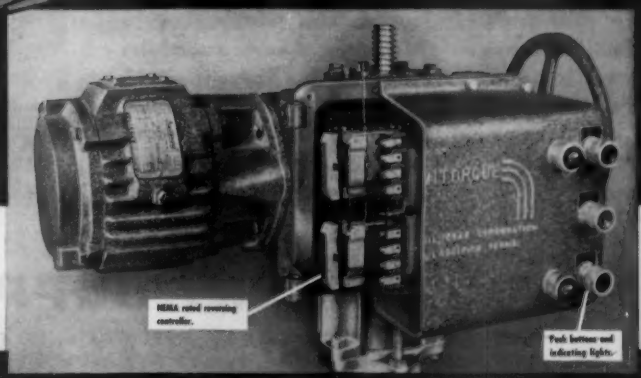

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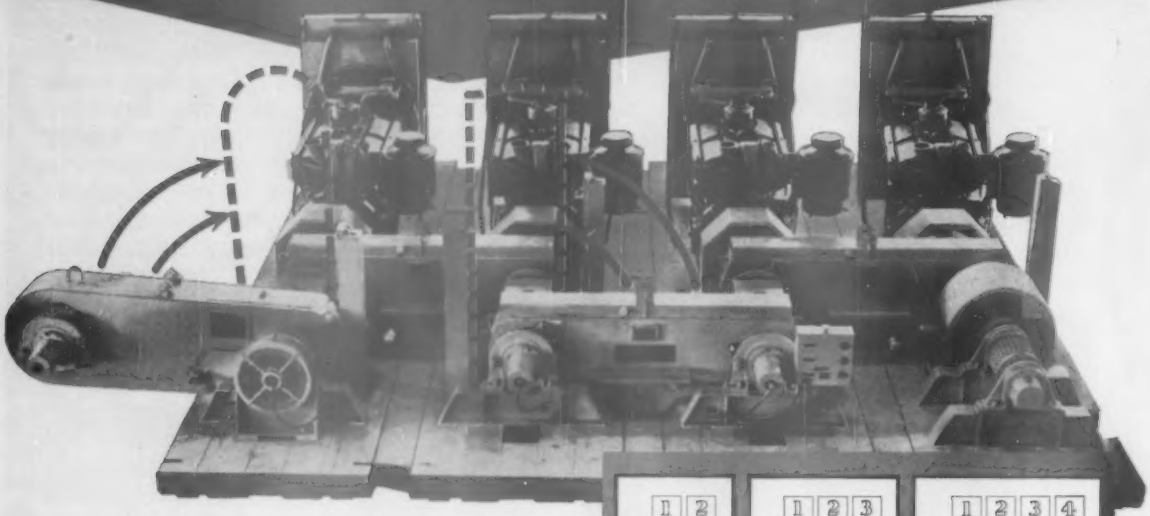

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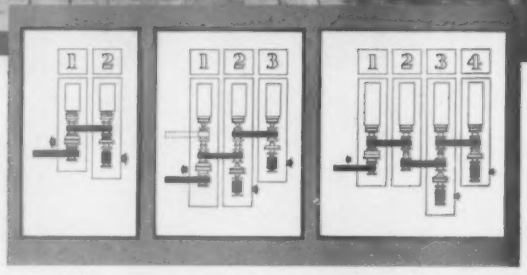

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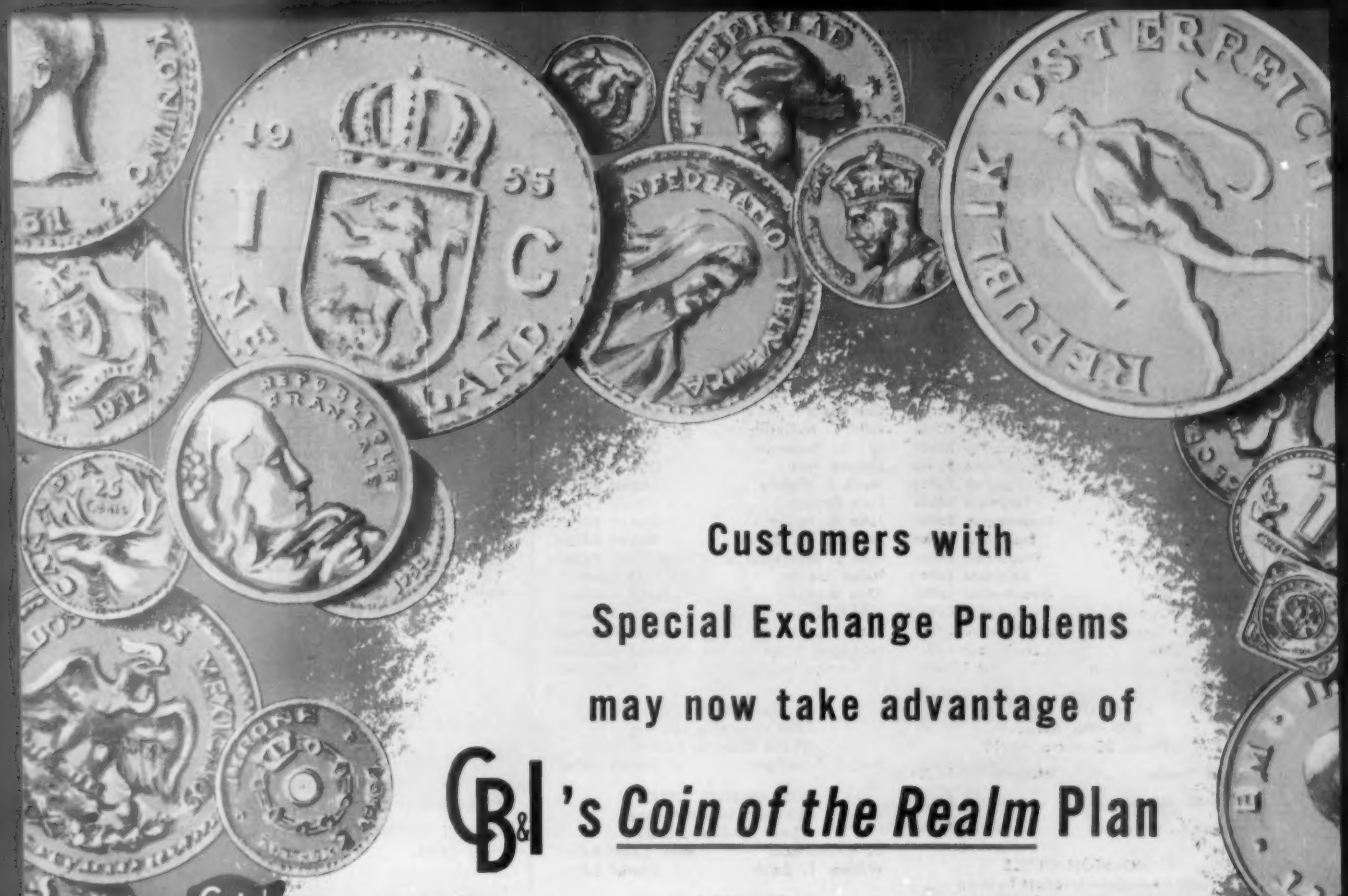

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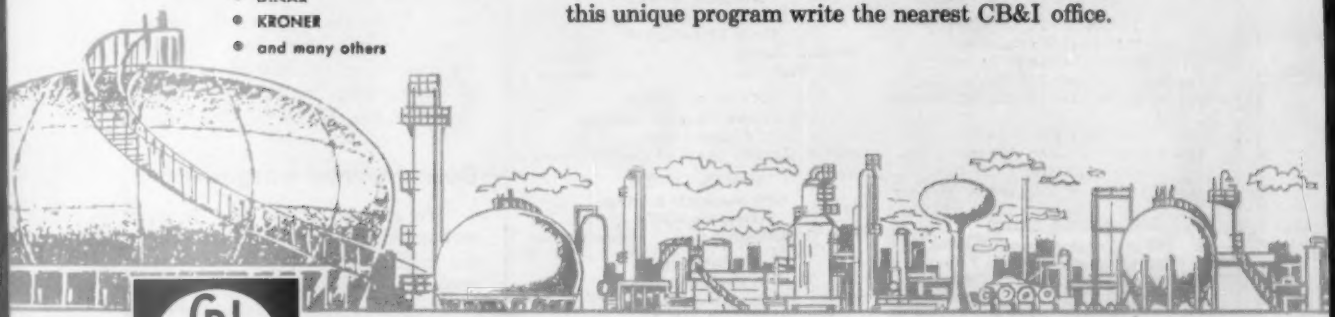

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They Say—

Survey improved

Dear Sir:

Your petrochemical survey (OGJ, Sept. 7, p. 121) is excellent.

We are pleased that you included the entire petrochemical report, that is, the articles by Bateman and by Kirsch and Kuhn as well as the 1959 survey of petrochemical plants.

Inclusion of petrochemical plants outside the United States this year is a distinct improvement.

Harold J. Barrett
Development Department
E. I. Du Pont de Nemours & Co.

Good laws work

"By avoiding the mistakes made in older oil producing states, North Dakota has earned the reputation for having model oil and gas conservation laws.

"Probably the best compliment is imitation; the Montana Oil and Gas Conservation Commission has revised its spacing regulations to essentially follow the North Dakota provisions.

"The Montana commission defended its action by noting that half the wells drilled in North Dakota are commercial compared to only one-third in Montana. The commission also emphasized that exploration money had been diverted to North Dakota from Texas and older oil states where wells have been drilled down to a 10 and 20-acre pattern.

"Montana's action is another testimonial to the fact that North Dakota oil and gas laws are good because they work. They do not benefit the oil industry alone, the state alone or the people alone, but they benefit all three groups."

Editorial in Fargo (N. D.) Forum.

Decentralized bargaining

"We should take a new look at methods to prevent future setbacks to our economy. All of us want to respect the rights of labor and management. But we also want the public to have its paramount right respected.

"Possibly, we might explore further whether or not it would be more in the public interest to decentralize the process of collective bargaining in basic industries so that the employer group of an individual company could bargain directly with a union repre-

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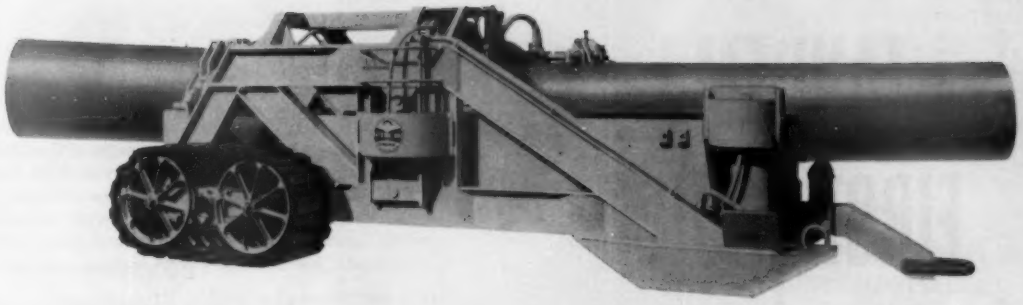
+ SIMPLE HYDRAULIC OPERATION
+ LIGHTWEIGHT



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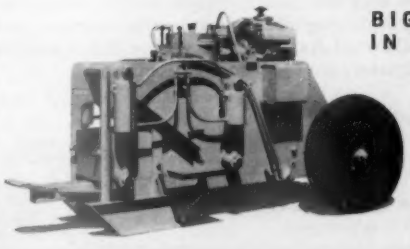
+ THREE MACHINE SIZES TO BEND PIPE RANGING FROM 6" THROUGH 36" IN DIAMETER



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for plus-profit payloads!

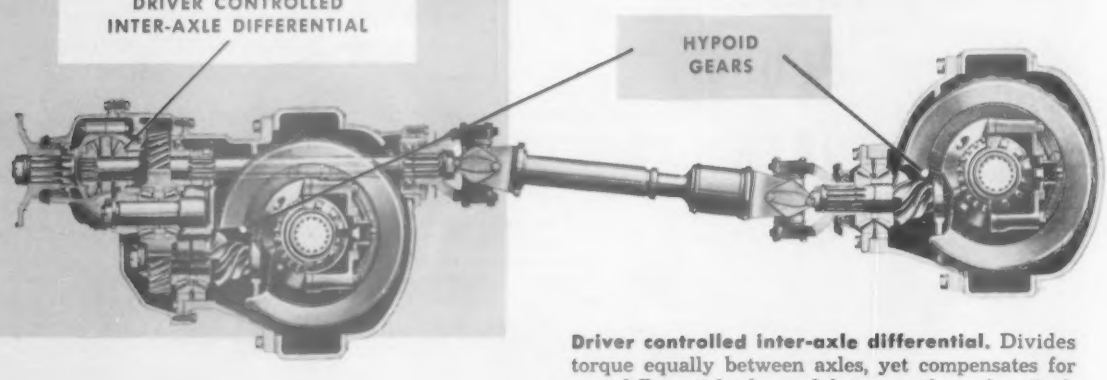
For more than three years Timken-Detroit Lightweight Tandems with Hypoid Single-Reduction Gears have been *first choice* with over-the-highway operators. Here are some of the reasons why:

Up to 700 lbs. lighter. Lighter in weight than other tandems currently available, Timken-Detroit's efficiency of design is unmatched in the industry. This not only means lower initial cost but *greater revenue from every payload.*

Hypoid gearing. Provides up to 30% more strength than spiral bevel gearing of the same size. Stronger design gives longer life and lower maintenance costs. To match hypoid gear performance, a spiral bevel gear must be larger and heavier.

Widest choice of axle ratios. Because of the stronger hypoid gear set, it is practical to provide high numerical axle ratios up to 8.6 to 1. To provide axle ratios greater than approximately 7 to 1 with spiral bevel gearing, some form of auxiliary ratio multiplication is required. This increases both weight and cost.

"In-Line" through drive. Eliminates compound angles, and reduces drive line wear and maintenance. Differential carriers are centered to permit common axle shafts.



Driver controlled inter-axle differential. Divides torque equally between axles, yet compensates for any differential of speed between the axles. Both axles are always doing equal amounts of work. Can be locked out at any speed when poor traction conditions exist.

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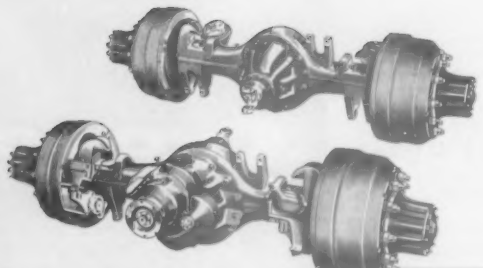

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Transmission and Axle Division, Detroit 32, Michigan

senting their own employes and not be forced to deal with industry-wide unions.

"Such decentralization would tend to cement the real interests of labor and management in maintaining the individual company's competitive position in the specific industry.

"Such decentralization also might prevent the heads of a national or international union from calling out the almost total labor force of an entire basic industry and thus paralyzing the whole nation's economy.

"The question could then be raised whether agreement by nation-wide union leaders to tie up an entire industry is not just as much a violation of anti-monopoly principles as would be collusion on the part of business —say—to fix prices. Both acts restrict competitive forces. Both acts are contrary to the national interest."

Frederick H. Mueller, Secretary of Commerce, in a speech to the annual congress of American industry, National Association of Manufacturers, New York City.

Everything moves up

"We have probably found and tested the shallower parts of perhaps 90% of the sedimentary accumulations and sedimentary basins in the United States.

"And, although much oil remains to be found in this country through deeper, costlier drilling and in the expensively located, hard-to-predict stratigraphic traps, it is obvious that new commercial reserves will only be encountered in this country at a much greater cost per barrel than those found up to now.

"The success ratio of 1 to 9, more or less stable in this country over the past 20 or 30 years, is more apparent than real. In many cases, so-called discovery wells are marginal or submarginal producers, and a more realistic idea of the risks and costs involved may be attained when one is told that some 330 wells are being drilled to find a 10-million-barrel field, and nearly 1,000 wells are needed to find a single reservoir on the order of 30 million barrels."

William E. Humphrey, exploration vice president, Pan American International Oil Co., New York.

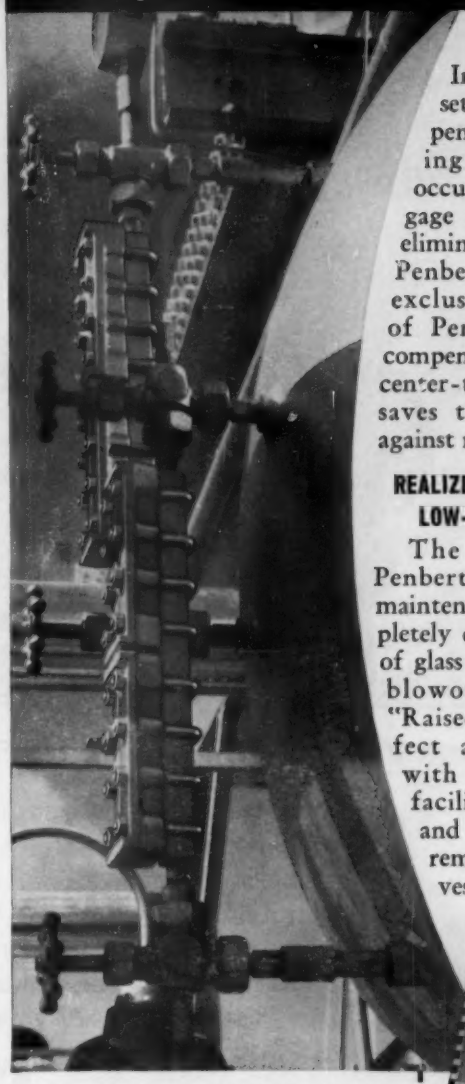
Real job security

"We have been witnessing in American industry an increasing number of management-labor disputes. Most of them seem to be caused, not by a disagreement over wages, but a controversy over restrictive work practices.

"The term 'restrictive work prac-

Save 50% or more

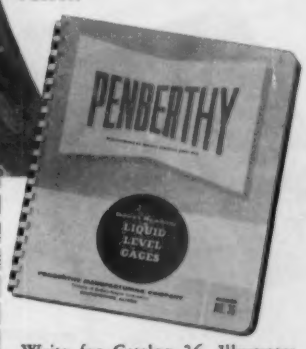
When you install PENBERTHY gage sets



Installing ordinary gage sets can be needlessly expensive and time consuming where inaccuracies occur in vessel tappings or gage assemblies. This is all eliminated when you mount Penberthy Gage Sets. The exclusive "Floating Shank" of Penberthy gage valves compensates for up to 3/8" center-to-center variation — saves time — and protects against mounting stresses.

REALIZE FURTHER SAVINGS IN LOW-COST MAINTENANCE

The unique design of Penberthy gages minimizes maintenance. The cover completely encloses sides and ends of glass and gasket to prevent blowouts. Full accessible "Raised Face" assures perfect alignment of frame with glass and gasket — facilitates cleaning, repair and maintenance without removing assembly from vessel.



Select the Right Gages for Your Requirements

REFLEX TYPE — 3 pressure groups to 3000 psig. Lengths to 12 ft.

TRANSPARENT TYPE — 4 pressure groups to 10,000 psig. Lengths to 12 ft.

SPECIAL SERVICE TYPES — High pressure, Frost-proof, Heating tube and Heating chamber, Welding pad, Large chamber and Inclined gages, Explosion-proof illuminator.

Write for Catalog 36. Illustrates complete line in detail including technical data, selection chart, specifications and properties, installation-maintenance instructions.

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Division of Buffalo-Eclipse Corporation

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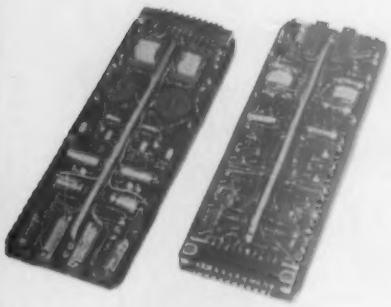
FM PORTABLE

Future methods demand Hi Fidelity Full Spectrum FM Magnetic Recordings!

TRANSISTORIZED
MINIATURE MODULES



With the recent miniaturization of FM modules, more Geophysicists now specify the full spectrum SIE FM Recording System "RecorData" — the only *low power-drain* all-purpose system for refraction, conventional and high-resolution seismic recording.

In addition to the latest advancement in portability, the new "RecorData" (PMR-20) gives you:

- **System performance not dependent on tape quality.**
- **No modulation noise.**
- **Wide frequency response (1 to 500 cps).**
- **Negligible phase shift from 5 to 500 cps.**
- **A complete recorder in two packages.**

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tices' covers a wide variety of contract provisions, unwritten union-management 'understandings,' and unilateral union imposed practices. It includes not only rules requiring the use of more workers or more manhours than are necessary to perform a particular task, but also other practices which hamper the effective use of manpower.

"With the intense increase in competition—both domestic and foreign—in recent years, managements began to search for ways to cut costs. It was quite natural that attention became focused on the use of improved equipment and more efficient use of manpower.

"In attempting to modify work practices, it is easy to see how a disagreement would develop.

"Many employes honestly became deeply concerned over the possible effect such changes would have on job security.

"Managements point out, however, that job security cannot be very real in a company which is bogged down with inefficient practices and wasteful uses of manpower.

"In a free economy such as ours, job security depends ultimately on the security of the enterprise—its ability to stay in business through sound, efficient, and economic business practices."

T. S. Peterson, president, Standard Oil Co. of California, in a letter in the November issue of Standard Oiler, company magazine.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR OF EVENTS

JANUARY

11-13 Alberta Society of Petroleum Geologists, first international symposium on Arctic geology, Hotel Palliser and Jubilee Auditorium, Calgary.

11-15 Society of Automotive Engineers, annual meeting, Sheraton-Cadillac Hotel, Detroit.

15-16 Association of Oilwell Servicing Contractors, annual meeting, Baker Hotel, Dallas.

17-19 Kansas Oil Men's Association, annual convention, Broadview Hotel, Wichita.

18-20 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville.

22 Natural Gasoline Association of America, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

25-28 Plant Maintenance and Engineering Show, produced by Clapp & Poliak,

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The Time-and Job-Proven Method of Reducing Piping Costs

NEW RIGID COUPLING STYLE 88

For Tank Batteries, LACT, Field Headers, Water Flood Manifolds and other Oil Field Piping
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FOR CEMENT LINED PIPE
With New Y-Insert Gasket
- Eliminates cavity between pipe ends
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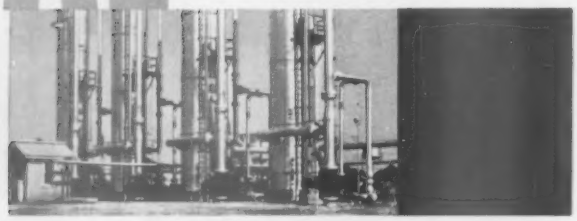
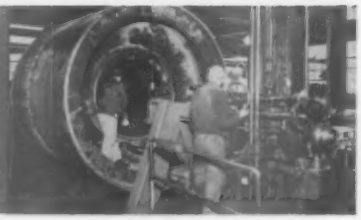
4. DELIVERY by rail, truck or inland, coastal or overseas waterway.

1 FABRICATION



2 MACHINING



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SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE • SINCE 1916 • CHESTER, PA.

Inc., Convention Hall, Philadelphia.

31-Feb. 3 Pipe Line Contractors Association, annual meeting, Ambassador Hotel, Los Angeles.

FEBRUARY

1-4 Instrument Society of America, instrument-automation conference and exhibit, Rice Hotel and Houston Coliseum, Houston.

8 Alberta Division of Canadian Petroleum Association, annual meeting Hotel Palliser, Calgary.

7-10 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Billings, Mont.

14-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Statler-Hilton and McAlpin hotels, New York.

21-24 American Institute of Chemical Engineers, meeting, Biltmore Hotel, Atlanta.

24-25 Wisconsin Petroleum Association, annual convention and exhibit, Schroeder Hotel, Milwaukee.

24-26 National Association of Corrosion Engineers, Tulsa section, eleventh annual corrosion short course, Mayo Hotel, Tulsa.

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex

26 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.

MARCH

2-4 American Petroleum Institute, Division of Production, southwestern district meeting, Statler-Hilton Hotel Dallas.

7 Canadian Petroleum Association, annual general meeting, Hotel Palliser, Calgary.

14-18 National Association of Corrosion Engineers, sixteenth annual meeting Memorial Auditorium, Dallas.

16 Petroleum Equipment Suppliers Association, eastern district membership meeting, Duquesne Club, Pittsburgh.

16-18 American Petroleum Institute, Division of Production, southern district meeting, Hilton Hotel, San Antonio.

18 Natural Gasoline Association of America, Oklahoma regional meeting, Biltmore Hotel, Oklahoma City.

21-23 Midwest Gas Association, annual meeting, Hotel St. Paul, St. Paul.

22 Petroleum Equipment Suppliers Association, Gulf Coast district membership meeting, Shamrock Hilton Hotel, Houston.

24-25 New England Gas Association, annual meeting, Hotel Statler-Hilton, Boston

28-30 Western Petroleum Refiners Association forty-eighth annual meeting, Hilton Hotel, San Antonio, Tex.

29-31 American Power Conference, annual meeting, Sherman Hotel, Chicago.

30-Apr. 1 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel Wichita.

APRIL

3-8 Engineers Joint Council, sixth nuclear congress, New York.

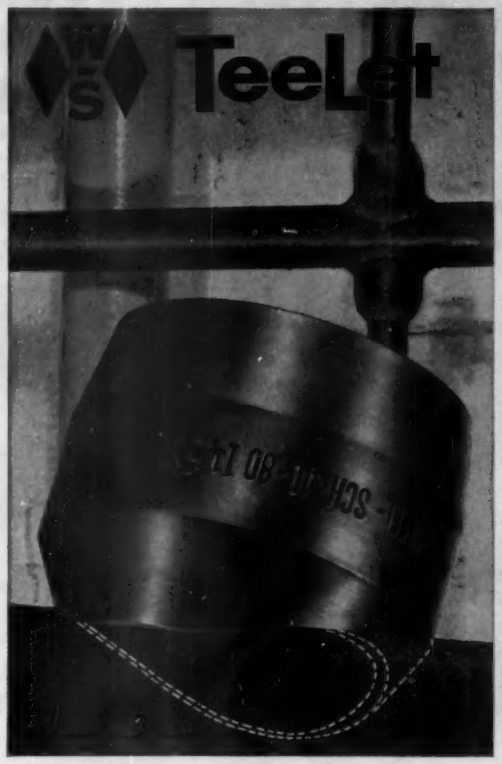
4-7 Oil Heat Institute of America, annual convention, Park-Sheraton Hotel, New York.

4-7 National oil heat and air-conditioning exposition, Coliseum, New York.

5 Petroleum Equipment Suppliers Association, southern mid-continent district membership meeting, Statler Hilton Hotel, Dallas.

5-7 Instrument Society of America, na-

FOR ⅛ TO 1½ INCH BRANCH CONNECTIONS



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NEW W-S TeeLet SLASHES TEE COSTS 50% OR MORE!

The new W-S TeeLet replaces conventional Tees of cast or malleable iron, welded or forged steel . . . requires fewer stock sizes. Available in sizes from ⅛ to 1½" IPS, TeeLets are fully machined from forging quality solid steel bars and adapt to run-pipe sizes to 36". They require no additional joint strength calculations for any ASTM A-53 or A-106 Grade B run-pipe of Schedule 40 or 80.

What about cost? A size-by-size comparison with conventional Tees shows TeeLets average less than 50 per cent of the cost you now pay. A W-S TeeLet, with screwed, socket-weld or butt-weld ends, requires no shaping, fitting, beveling or extra alignment. You can connect to the run-pipe at any point. Short heights mean easy inspection of the attachment weld or back-weld, if desired.

A W-S TeeLet costs less to buy, less to install than anything you can buy or make. For complete information, prices, and names of distributors, write: *Forge and Fittings Division, H. K. Porter Company, Inc., Box 95, Roselle, N. J.*

FORGE AND PORTER FITTINGS DIVISION

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PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

THOMPSON
SAND RESISTANT OIL WELL PUMPS

TRAVELING PLUNGER ROD TYPE
BOTTOM HOLD-DOWN PUMP
STANDARD SIZE

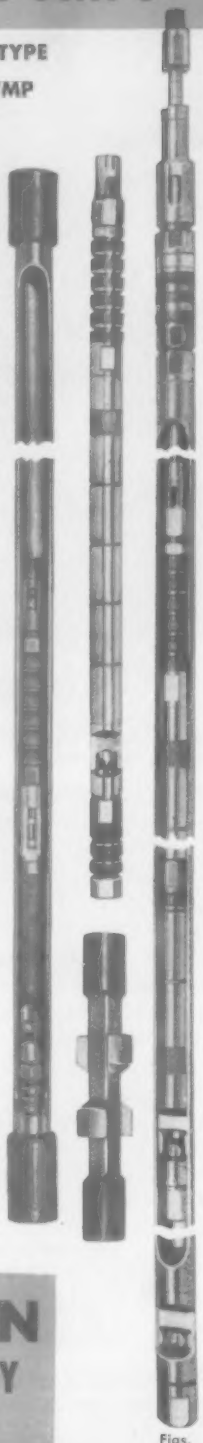
Single or double, self-aligning, combination cup and plunger or all-metal traveling plunger type, pumps made in four sizes: regular 1½", 1⅝" oversize, 2" regular and 2⅛" oversize bore. These pumps seat in API seating device. In very sandy wells, or when tubing is out, we recommend our SAND HOUSING MECHANICAL SEATING SHOE, which prevents sanding in of pumps as sand can be pumped and the pump pulled at any time by our sand flushing arrangement.

TOP HOLD DOWN INSERT ROD PUMP
Standard Size, Figs. 400T, 500T

Self-aligning double plunger insert pumps. Made in three types: combination cup and single plunger; combination cup and double self-aligning type; and metal-to-metal double plunger self-aligning type.

COMBINATION ROD GUIDE AND PARAFFINE SCRAPER

This exclusive Thompson device eliminates wear on rods and pumps. Insures proper alignment and removal of paraffine ahead of pump. Allows pump to pull freely. Standard equipment with many Mid-Continent operators.



Figs. 400T 500T

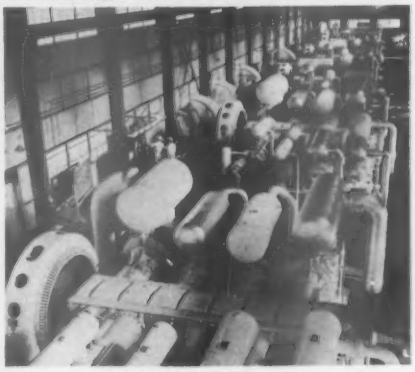
THOMPSON PUMP COMPANY
DRAWER 591
OKMULGEE, OKLA.

BURGESS-MANNING

SNUBBER NEWS

Dedicated to the Elimination of Pulsation and Intake and Exhaust Noise

Largest Installation of Burgess-Manning Pulsation Snubbers



The compressor room of the Petroleum Chemicals, Inc. Ammonia Plant, showing a few of the 98 snubbers installed in this plant.

Protects Petroleum Chemicals, Inc. Ammonia Plant from Damaging Pulsation

Foster Wheeler Corporation was contracted by Petroleum Chemicals, Inc. to design and construct the multi-million dollar Ammonia Process Plant at Lake Charles, Louisiana.

Realizing from the start that gas pulsation would cause severe operational problems in multi-service process piping related to reciprocating compressors and that hazardous pulsation should be engineered out of the Plant in initial design, Foster Wheeler Corporation called upon the Burgess-Manning Company to develop Pulsation Snubbers for various service conditions and for installation under the original contract.

Ninety-eight Pulsation Snubbers of 46 individual designs were installed on multi-stage, multi-service compressors. These Snubbers were installed on both the suction and discharge side of the compressor cylinders in what is believed to be *the largest single installation of Pulsation Snubbers under one roof.*

The compressors handle various types of gases, ranging in molecular weight from 5.13 to 33 at pressures from atmospheric to 9270 psia, and discharge temperatures to 350°F. Under these exacting conditions, Burgess-Manning accepted the responsibility to engineer and supply Pulsation Snubbers of optimum design to:

a. Hold the pulse amplitude to two per cent or less, total surge peak-to-peak, of absolute line pressure; and

b. Hold to a minimum pressure drop requirement.

The snubbers were subjected to stringent specifications; i.e., material, workmanship and inspection procedures, normally followed by Foster Wheeler Corporation in process plants of this type. All forged snubbers for high pressure service were made of high tensile alloy steel, with internal assemblies engineered to withstand extreme forces.

After the plant went on stream, operational inspection revealed minimum pulsation-induced vibration, eliminating this operational hazard and constant maintenance, or upkeep of the laterals, headers, intercoolers and separators attendant to the snubbers.

If you are planning a new plant, or have a pulsation problem in your present plant, it will pay you to consult Burgess-Manning engineers.

Sound Engineering

BURGESS-MANNING COMPANY
Industrial Silencer Division
9217 Sovereign Row, Dallas 35, Texas
Libertyville, Illinois

tional chemical and petroleum instrumentation symposium, Rochester, N. Y.

12-14 Petroleum Industry Electrical Association, Petroleum Electric Supply Association, conference and exhibition, Municipal Auditorium, Kansas City.

19-21 University of Oklahoma, College of Engineering, southwestern gas measurement short course, north campus, University of Oklahoma, Norman.

20-22 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

20-22 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

21-22 Texas Technological College, seventh annual West Texas oil lifting short course, Lubbock, Tex.

21-23 Society of Economic Paleontologists and Mineralogists, Permian basin section annual meeting and field trip, Abilene, Tex.

24-26 Independent Petroleum Association of America, midyear meeting, Denver Hilton Hotel, Denver.

25-27 Southern Gas Association, convention, Buccaneer and Galvez hotels, Galveston.

25-28 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

25-29 American Welding Society, annual meeting and welding exposition, Los Angeles.

26 Petroleum Equipment Suppliers Association, Pacific district annual membership meeting, Ambassador Hotel, Los Angeles.

27-29 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

28-29 American Petroleum Institute, Division of Transportation, pipeline conference, Mayo Hotel, Tulsa.

28-29 Pacific Coast Gas Association, distribution conference, Benson Hotel, Portland.

MAY

1-4 American Petroleum Institute, Division of Transportation, tanker conference, Seaview Country Club, Absecon, N. J.

2-3 Society of Petroleum Engineers of AIME, North Texas section, fourth biennial secondary recovery symposium, Wichita Falls, Tex.

5-6 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual joint meeting of Rocky Mountain petroleum sections, Calgary.

5-6 Canadian Institute of Mining and Metallurgy, annual technical meeting of petroleum and natural gas division, Palliser Hotel, Calgary.

9-11 Instrument Society of America, power instrumentation symposium, San Francisco.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Statler and Sheraton-Cadillac hotels, Detroit.

9-13 American Gas Association, distribution and transmission meeting, Jung and Roosevelt hotels, New Orleans.

12-13 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

HYCALOG

NEW WELL LOGGING PACKAGE CUTS COSTS... PROVIDES EXTRA INFORMATION

CONTINUING RESEARCH FOR LOWER COST EXPLORATION

Continuous chromatographic monitoring and analysis of gas shows... *along with recording of principal drilling functions*... are combined in Hycalog's new GR-FDR package. And automatic operation permits the use of this equipment with *only one* attendant.

The package includes *two complete recording networks*... HYCALOG GAS CHRONOFRAC and a hot wire detector. One monitors methane content of mud gas samples and analyzes shows; the other records total combustible gases.

Added to this is the MARTIN-DECKER recording network which automatically measures and records the following drilling functions: weight on bit, pit level, pump pressure, and pump speed. (Recording of other functions such as torque and rotary speed are optional).

A *single* operator compiles and forwards daily all recorded data along with the log of any shows encountered.

With the new GR-FDR package you are sure of getting *round-the-clock* information at a cost far below regular well logging service.

Write for facts on the GR-FDR package. *And, while you're at it, ask about* HYCALOG V-DOOR *diamond drill bits.*

Hycalog, Inc.

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BRANCH OFFICES IN PRINCIPAL OIL PRODUCING AREAS

DIAMOND CORING • DIAMOND BITS • WELL LOGGING • CORE ANALYSIS

"...pacing the pipeline construction industry
for more than a quarter century"

price tower H·C·PRICE·CO PIPELINE CONSTRUCTORS bartlesville, oklahoma

10 years ago

December 29, 1949

Gigantic world-wide struggle between dollar and sterling oil looms as British Government prohibits imports into United Kingdom after January 1 of any fuel oil which must be paid for in dollars. Imports of motor fuel cut one-third. Action deals severe blow to American oil companies operating abroad. Washington protests.

New coal hydrogenation demonstration plant at Louisiana, Mo., makes first successful conversion of tar oil and coal to gasoline and other liquid fuel.

Drilling experts of major company look to "slim" slim-hole drilling, using 1½ to 4-in. diamond-core heads, to depths of more than 10,000 ft. as possible new technique for reducing cost of wildcatting.

25 years ago

December 27, 1934

Stanolind Oil & Gas Co. (Pan American) opens production on large Hastings prospect, southeast of Houston, as possibly the most important discovery on the Texas Gulf Coast since Conroe. Discovery well, 1 Surface, flows 4 to 5 bbl. of 38°-gravity oil hourly through 3/16-in. choke with estimated gas production of 5,000 M.c.f. daily.

Federal Petroleum Administrator Harold Ickes threatens to declare oil industry a public utility unless it takes immediate steps to put its house in order. "Unparalleled" waste of gas in Texas Panhandle assailed.

50 years ago

January 6, 1910

The Texas Co. buys three 40-acre tracts adjoining its Clinton tank farm, south of Tulsa, where, it is rumored, the company will build a refinery such as the one it has at Dallas. Clinton tank farm is the northern terminus of the company's 8-in. oil line to the Gulf Coast.

Newly incorporated Arkansas Natural Gas Co. to lay gas line from Vivian, in northwestern Louisiana fields, to Little Rock. New 237-mile system to carry first natural gas to that city and also serve intermediate cities Hot Springs, Pine Bluff, Camden, and Malvern.

Annual survey shows West Virginia the only state to show increase in oil development during 1909. Principal activity reported in Roane, Harrison, and Lincoln counties. Shinnston pool featured by completion last week of 4,000-bbl. oil gusher.

JOURNALLY SPEAKING

THE JOURNAL arrives at a drilling camp in the Sahara Desert.

To the Shores of Tripoli

LIKE the Marines, the oil industry has reached the shores of Tripoli and then some.

And as the search for oil spreads throughout the world, the Big Yellow Book goes with it. At last count, the Journal was going to more than 90 foreign countries.

The photo above was snapped as the mail plane from Tripoli arrived at American Overseas Petroleum, Ltd.'s, drilling camp on its Beda concession, well into the interior of Libya. Jim Parry, right, an Amoseas geologist, is receiving this particular copy of the Journal.

Parry and other oil men scattered in the foreign oil patch will find something special in the current issue of the Journal. This is our World-Wide Oil Report, the annual special issue featuring a review of the international oil business.

International Editor Paul Swain and his right-hand man, Ray Gibson, have put together 60+ pages of significant and timely information about the international oil business. And to boot, there is an insert map spotting oil developments in Europe, North Africa, the Middle East, and part of Russia. (Note to Parry: We've got Amoseas' Beda discovery on our map as well as other important fields in the areas mapped.)

The big noise in our special report is 42-page, country-by-country rundown on oil installations in every country outside the U. S. and Canada. This is a "returned by popular demand" section of the report that has gained wide acceptance over the years.

OUR FOREIGN subscribers get one of the best bargains on the world market in their Oil and Gas Journal. In fact, it costs us more to mail it to them than it does for them to subscribe.

Our average foreign postage is 15 cents an issue or $7.80 a year. Since a foreign subscription costs only $5 (the rate is the same any place in the world), we spend $2.80 over the subscription price just to mail a Journal to our overseas readers. But we feel this is good business and are willing to take on more of the same.

And many of our foreign readers feel the Journal is so packed full of news that they need it as quickly as possible. Some Journals are air-mailed overseas, with the postage running as high as $225 a year, or 45 times the subscription rate.

But whether you're a high-cost foreign subscriber or just a plain old garden-variety domestic subscriber, we feel you'll find something of interest in our world-wide report. Try it on for size.

Carl Lawrence

FOR PRACTICAL DUAL STRING COMPLETIONS

COMPARE THE SIMPLICITY, convenience and dependability of Baker Snap-Set Dual Packers with packers that depend on elaborate seals, valves and other intricate mechanisms.

Baker Snap-Set Dual Packers are easier to set than the simplest of hook-wall packers—just set down a slight amount of weight on the tubing to pack-off, simply pickup to release. They can be set and released as many times as desired without rotation, ball dropping or pressuring.

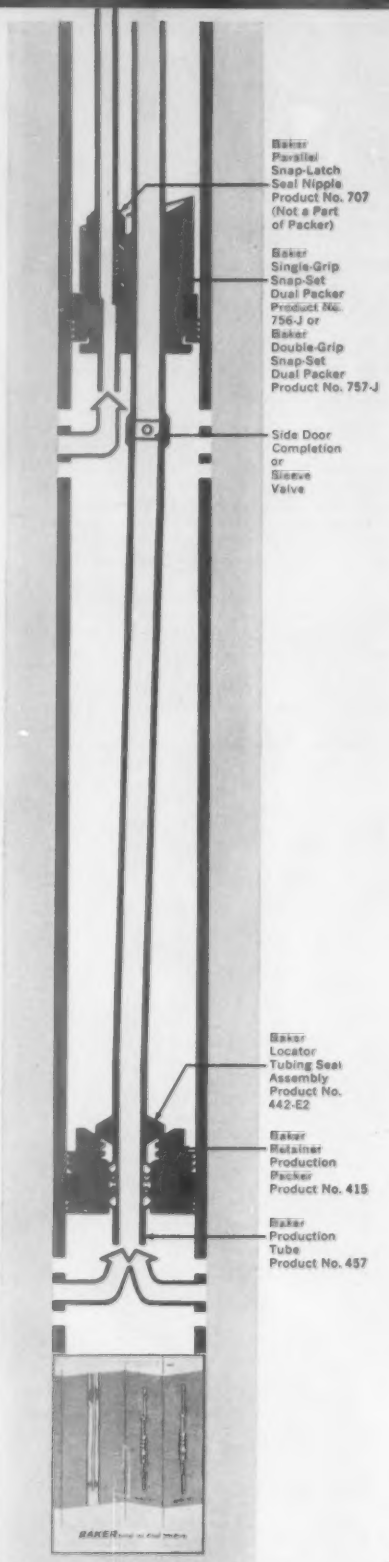
Baker Snap-Set Dual Packers offer full-opening through both sides for two strings of 2⅜" tubing when run in the popular 7" casing.

The Baker Model "J" Snap-Set Dual Packer is the ideal upper packer in a practical two-packer parallel string hookup, such as shown in the schematic at right. This hookup allows zones to be unloaded and washed after the well head is flanged up. Note that the vital separation of zones is provided by the reliable, time-tested, high-performance Baker Retainer Production Packer.

Baker Snap-Set Dual Packers are available with hydraulic button-type hold-downs where high differential pressures are to be encountered from below.

Ask for Catalog Supplement No. 357, which completely describes these packers and their use in selective-multiple zone completions, in addition to several popular dual-zone hookups.

BAKER SNAP-SET DUAL PACKERS
Shown is the Model "J", Single-Grip, Product No. 756-J.


Baker Parallel Snap-Latch Seal Nipple Product No. 707 (Not a Part of Packer)
Baker Single-Grip Snap-Set Dual Packer Product No. 756-J or Baker Double-Grip Snap-Set Dual Packer Product No. 757-J
Side Door Completion or Sleeve Valve
Baker Locator Tubing Seal Assembly Product No. 442-E2
Baker Retainer Production Packer Product No. 415
Baker Production Tube Product No. 457

CATALOG SUPPLEMENT NO. 357 describes Baker Snap-Set Dual Packers in complete detail.

In today's oil world no market is secure

THE FUNDAMENTAL change that has come over the world's oil industry is bringing some fundamental changes in the attitudes and operations of oil companies and governments everywhere.

For the first time in history, the world's oil supplies substantially exceed its needs. And potential producing capacity may keep ahead of projected requirements for the next decade.

So a searching reappraisal of policies is under way. Some of the results may be confused and conflicting, but the general outlines of the problem are clear enough.

WHEN IT IS EASIER TO FIND OIL than to find a market for it, a producing property without an assured market can be more of a liability than an asset. This may slow the rush of new adventurers into world exploration. Only those companies with specific marketing plans can afford to bid high for producing concessions.

Oil-exporting countries will have to take a long-range view. Instead of pushing output to the maximum, they must plan to extend production over a longer period. Concession terms, regulatory laws, and producing practices aimed at rapid depletion of a field may need revision.

Areas with the lowest producing and shipping costs will get the cream of the world markets. So producing nations must help their producers keep down costs. This will often involve the painful abandonment of concepts and practices long held but now unrealistic in today's condition of surplus and competition.

Unless—as seems unlikely—producing nations find some means to hold total output close to the world's consuming needs, there will be dog-eat-dog competition. High-cost oil will be at a disadvantage. But even with low-cost production, the successful operator must be a combination of supersalesman, efficient distributor, and high-level negotiator.

IN ADDITION TO COMMERCIAL COMPETITION, the exporter must buck the nationalism of countries protecting their domestic production. The United States has already embarked on this course, Canada is veering toward it, and France and some other nations have visions of self-sufficiency.

In the rest of the world the market potentials are enormous, for every country can confidently base its economy on the premise of ample supplies of low-cost oil.

All world markets are expanding, some very rapidly. But no market is secure to any supplier. Success in any oil operation will depend on the ability to assure both present and prospective markets of uninterrupted supplies at reasonable prices for many years into the future.

World Outlook Improved for 1960

• There's still too much oil, but the oversupply picture doesn't look too bad when you consider how demand has increased, particularly in Europe. The big question now is what will North African oil do to world markets.

Paul Swain
International Editor

THE FREE WORLD'S oil industry strides into 1960 in far better shape than it would have believed possible a year ago.

Except for the fact that it can still offer world oil markets a somewhat unhealthy surplus of crude, and the always delicate mixture of oil and politics gets more volatile all the time, most other things are on the plus side.

North Africa's emergence as not only a confirmed new oil province, but a major source of large volumes of crude is probably the biggest single legacy 1959 leaves the coming years.

Here are some of the others:

... **Reserves** in the free world are up 5.7% over a year ago with all the world's major producing areas contributing to the gain.

... **Production** increased 3.5% in 1959 as increasing demand continues to nibble away at the mountain of excess crude availability.

... **Refining capacity** increased 4.2% in spite of the fact that the actual number of operating refineries is down slightly.

... **World-wide demand** for oil will probably prove to be greater than all predictions when final figures for 1959 are compiled.

... **Producing wells** in the free world showed a 6% increase in 1959 in spite of large volumes of shut-in production in major producing areas like Venezuela.

... **Drilling** in the free world picked up slightly in 1959, primarily due to an upturn in drilling in the Western Hemisphere. As of December 1, there were 4,435 rotary and cable-tool rigs working in the free world compared with 4,353 at the same time last year. This is a 1.9% increase.

Here are some of the problems 1960 inherits from the year 1959:

... **A surplus** of crude available from well-established producing areas will be increased even more as newly discovered and developed North African oil jostles for a spot in the market place.

... **Increased political** pressure from local governments in almost every part of the world to create something other than the normal supply-demand relationship in the industry.

The surplus . . . The world is still plagued with a surplus of crude and this underlies the major ills of the industry. But ever-increasing demand is making the outlook brighter all the time.

So far the industry's oil finders have done too good a job. They have found new supplies of oil faster than markets can absorb them.

Private industry studies indicate the free world's immediately available excess crude capacity today may top 8.5 million barrels a day. This is oil that can be produced and moved by existing facilities.

If it were necessary, this probably could be pushed another 1.5 to 2 million barrels a day by a crash program to add additional production and transportation facilities.

This means that the industry today, or at least by mid-1960, could increase its flow of crude to already saturated markets by more than 36%.

The prospect that this or even anything approaching it will happen on short notice are slight, to say the least. The world is in better shape today to cope with a major emergency with respect to alternative sources of oil than ever before in the history of the industry.

There is also less likelihood of an emergency that would make a choice of alternates necessary.

Demand . . . The brightest spot in the picture today is the prospect that steadily increasing consumption of oil in the world will sponge up that surplus faster than previous estimates.

The industry's economists looked for a 7% increase in free world oil demand outside the United States in 1959. It now appears that this estimate was on the conservative side.

Oil imports by the 17 nations of Western Europe that make up the Organization for European Economic Cooperation were up 17.8% the first half of 1959. A similar increase during the second half of the year would mean a boost of at least 500,000 bbl. daily in oil movement into this area for the entire year.

Oil consumption in the United Kingdom in the first three quarters of this year was up 17.4% over the same period of 1958 and amounted to a daily average of 734,600 bbl.

In other words, the British Isles consumed more oil the first 9 months of 1959 than in the entire year of 1957.

The biggest increase, reflecting the general European consumption pattern, was in fuel and diesel oils which registered a whopping jump of 33.6% over last year. This market represents almost 54% of British consumption.

Similar increases are being recorded in France, Italy, and West Germany.

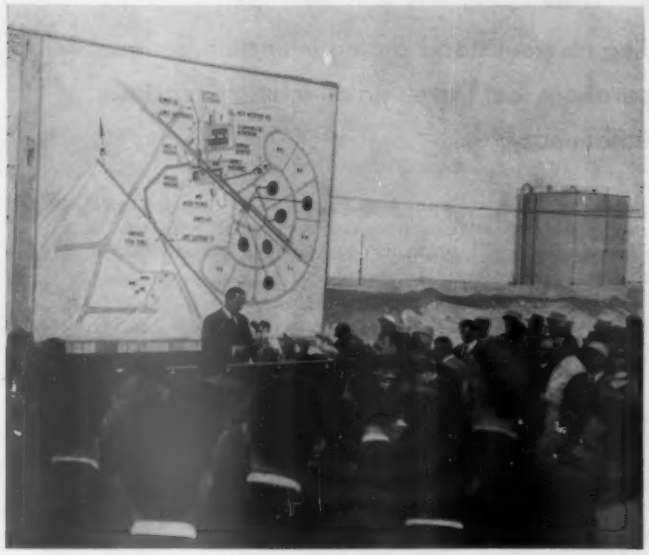
This kind of growing demand makes it easy to see why Eugene Holman, chairman of Jersey Standard, last week predicted a 1960 free world demand increase of 5%, or nearly 1,000,000 bbl. per day.

It also makes very plausible the Jersey forecasts for free-world consumption of oil in the 29-to-30 million barrel daily range by 1975.

North Africa . . . The almost startling drilling successes in Libya in the past year, plus the rapid development of French oil in the nearby Sahara, have put North Africa indelibly on the oil map and have almost overshadowed continued development in the prolific Middle East.

The French have opened one 24-in. pipeline outlet for Saharan crude that can move 100,000 bbl. daily of this new production and will soon have a second line completed.

North Africa in 1959:



IN ALGERIA the biggest event of the year was completion of the crude line from Hassi Messaoud. The line is the first step in freeing France of dependence on Middle East oil.

IN LIBYA Esso is testing Zelten 3, the third well in what looks like a major field. Zelten is only one of several promising fields developed in Libya this year.

Libyan operators, most of them American companies, had discovered at least 10 commercial oil fields in the country by the end of 1959, some of them sizable producers. There are 24 rigs running in Libya in what is easily the world's most intensified exploration effort. Another 10 rigs will be added in 1960.

The Libyan Government, to say nothing of companies operating there who do not have Middle East oil, will be bending every effort to move this new crude into European markets that are already supplied by the Middle East.

With the French exerting every muscle to obtain a preferred market in Europe for Saharan crude and Libyan operators looking to the same logical market for their production, the Middle East will certainly suffer a slowdown in expansion until demand can overtake the supply.

Drilling . . . The Western Hemisphere accounted for practically all the increase in drilling activity this year.

On a world-wide basis, there were 82 more rigs running December 1 than at the same time last year. The Western Hemisphere has 98 more rigs, while the Eastern Hemisphere was down 16 rigs.

The United States accounted for most of the increase. There were 50 more rigs operating in the U. S. for a 1.5% increase. Canada had an increase of 20 rigs and Mexico an increase of 10.

The surplus of crude was reflected in drilling activities in Venezuela. Rig activity was off 17 rigs for a 20.5% drop. However, Venezuela's loss was absorbed by the stepped up drilling in Argentina and Brazil. On December 1, Argentina had 99 rigs running compared with 70 last year and Brazil had 42 compared with 30 last year.

The stepped up search for oil in Libya and Algeria pushed Africa's active rigs to 100, which is 17 more than was running at the same time last year (see related story p. 88).

Europe had the biggest loss in drilling activity. There were 245 rigs running December 1, 27 less than last year. Australia also showed a drop, from 56 down to 48.

Additional exploration by newcomers in the Middle East gave that area a net increase of 2 rigs.

Don't Miss

. . . the World-Wide Oil Report beginning on page 90. This is an annual Journal feature giving a country-by-country rundown on oil activities around the world and feature articles of significance to the international oil business. Another extra in this issue of the Journal is a 20-by-32 in. map of oil installations in the Middle East, North Africa, and Europe.

Refining . . . To accommodate the world's increasing demand for petroleum products, refiners have already scheduled the construction of 30 new refineries. With expansion of existing plants, they will add 2,326,000 bbl. daily of basic crude capacity.

A number of these new plants and expansions of existing plants is already under way. Some in Japan are projected as far ahead as 1964. By that time the list of construction projects will certainly have grown larger.

Europe alone has under way 11 new refineries and building projects at old plants that will add 924,000 bbl. of daily basic crude capacity to its refining industry.

In the Far East, 13 new refineries are planned with a total throughput of 465,000 bbl. daily. Eight of these are slated for Japan where refining capacity will be boosted 290,000 bbl. daily by 1964, according to present plans.

Africa will add 66,000 bbl. daily of crude capacity by adding to Egypt's refineries and the construction of a new 44,000 bbl. plant in Algeria.

Latin America has under way or planned refinery projects which will add 847,000 bbl. daily to this area's capacity. All of it except for two planned refineries in Panama, a third in Argentina and another in Guatemala, represents expansion of existing refineries.

Oil Catching Up During Steel Truce

• Oil companies have been building up steel stocks during injunction period. Another strike would slow up operations, but there's no oil-industry pressure for settlement which might be inflationary.

OIL COUNTRY steel is almost plentiful again.

Some oil companies have received their fourth-quarter orders and have built up respectable inventories.

Others say all current needs for tubular goods can be met easily, but they voice doubts about being able to stand another protracted strike without slowing up operations.

Whether oil — or other industries needing steel—faces further shortages will be known soon. Under provisions of the Taft-Hartley-invoked 80-day injunction, steel's union workers start voting January 6 on whether to accept the last contract offer of steel management. If a settlement has not been reached by January 26, the end of the injunction period, the workers are free to walk out again.

Last offer of the steel companies November 15 included: Wage rate increases ranging from 6 to 12 cents an hour over the next 2 years; payment by companies of entire cost of life, sickness, and accident insurance; greater company cash payments into the supplemental unemployment benefits fund; increased pensions; and increased cost of living adjustments. Total cost is estimated by the companies at 38 cents an hour.

In addition, the companies offered to submit the controversial work rule changes to study by a union-management committee until June 30, 1960, when the issue would go to compulsory arbitration.

This package was quickly rejected by United Steelworker President David J. McDonald as offering nothing new. Since then, neither side has made any significant new offers.

Oil reaction . . . There's no pressure coming from the oil industry for steel management to settle on any terms just to avoid another strike.

The feeling is general among oil-country buyers that steel needs to hold the line against further inflationary increases in the prices of steel goods. These prices are one of the big costs of doing business for the oil industry.

Very few oil-country buyers are talking about prices now. But they know that historically any major wage increase to steel workers is quickly reflected in higher prices for steel.

These periodic price hikes have been offset some by slim-hole drilling, new completion techniques, use of aluminum or plastic pipe, and other ways to reduce the industry's need for steel. But there's a limit to how much savings in use of steel can be achieved, and oil men are still among the major users of steel.

Company position . . . The larger oil companies are feeling no steel shortages at all now.

The buyer for one major with a large drilling program observes: "The shortage is gone. We've been offered extra pipe from suppliers who have it available because original buyers didn't want the stuff after it was rolled. This indicates to me there's no critical shortage anywhere."

This executive reports he plans no unusual inventory buying for 1960.

"We plan only our regular buying," he says. "Here's the reason: If workers vote to accept the companies' offers, we'll quickly have all the steel we'll ever need. Mill capacity has grown so much that operations at 75 to 80% of capacity will soon fill the inventory pipeline. Mills then will start building up their river warehouses with oil-country steel items and we won't have to carry a big inventory again."

Another buyer for a major observes: "We got 11 cars of pipe delivered in the first week the strike ended. It has been going like that since. If we continue to get deliveries as we are now, by January 26 we would have our inventories built back to a 3-month supply."

A smaller integrated company gives this report: "We'll get all our fourth-quarter orders delivered by December 31. Linepipe still is a little short. Our main problem right now is getting enough 55-gal. steel drums."

Even the smaller dimension pipe apparently is coming on the market in greater quantities. One buyer says that 4½-in. tubing is more plentiful. He also says that 2⅞-in. tubing reportedly was tight, but with five or six calls to supply houses last week he was able to buy 78,000 ft. of the material.

Supply houses . . . One supply firm with both major and independent customers in the oil patch says flatly, "Nobody's hurting now for materials."

He gave this picture of the present steel buildup:

Eastern mills are supplying Kansas City depots by rail. Barge terminals at Vidalia, Harvey, and Houston also are building up.

Supplies still lack balance with a tightness apparent in 2, 3 and 4-in. continuous-weld line pipe. Casing and tubing generally are okay.

Another supplier reports mills moving steel items steadily both to customers direct and to barge terminals. "We're gradually getting in shape to handle all comers," he said.

An executive of one major oil-country supply house with direct mill affiliation complains that shipments still are far from normal. He says shipments in December probably will be only 60% of normal with the first normal month probably in January. "If the strike starts all over again, we'll be in poor position this time to last long," he says.

Outlook for 1960 . . . The oil industry probably will step up its use of steel in the coming year.

Steel men are counting on good sales for producers of oil-country goods, line pipe, valves, and compressors.

They estimate natural-gas transmission and distribution companies will spend $1,898,000,000 during the year —an all-time record. Spending in 1959 was estimated at $1,859,000,000 and $1,618,000,000 in 1958.

Tubemakers estimate they'll ship 2.4 million tons of oil country goods during 1960, according to Steel magazine. If the steel strike hadn't occurred, the oil industry would have ordered 2.6 million tons this year. Instead, shipments probably will be only 1.9 million tons. The magazine also estimates that the oil and gas industry will order 3.5 million tons of line pipe compared with 2.6 million in 1959.

Economists are nearly unanimous in predicting that 1960 will be a good year for business. Both the steel and oil industries expect to share in the general well being—provided another steel strike can be avoided.

Universal Credit Card Getting Close Study

• New Chicago firm is making a bid to take over credit work of all oil firms tired of the problem. Presentation will be made to 17 companies in January.

A UNIVERSAL oil credit card may become a reality sooner than expected.

A group of Chicago business men has incorporated Oil Services Credit Corp. for $10,000,000 to handle the credit business of oil companies.

For a maximum fee of 4% of gross retail sales, the new firm proposes to handle credit investigations, issue credit cards, supply imprinters and sales tickets, do all billing and collecting, and do promotional credit advertising for all companies subscribing to its services.

The new plan already has been presented to five oil companies. Seventeen more which have indicated interest have been invited to a presentation in January. No contracts have been signed.

Here are some of the things the Oil Services Credit Corp. plan would involve:

...A minimum 3-year contract by a participating company.

...A universal card, carrying on the back the names of all participating companies.

Customers of a particular company would receive a card bearing on its face a line saying the card was issued by that company. If two or more companies have issued cards to the same person, he would be asked to retain one, returning the other.

...A 1½% monthly interest charge on accounts not paid in full within 30 days.

Sponsors believe this would speed payment and would also bring in enough additional money to cut the cost of the project to 3½% of gross sales the first year. They predict over-all costs would be reduced to 2½% at the start of the third year of operation if the sales volume is large enough.

...An advisory committee, made up of a representative from each participating company. This group would determine credit and other policies of the corporation.

The company . . . Ralph W. Applegate, Chicago industrialist, is president of Oil Services Corp.

M. S. Weeks, Chicago, is executive vice president and in charge of presentations being made to oil company representatives. Fourteen other Chicago businessmen are directors.

Applegate is president and director of Casualty Mutual Insurance Co., The Fabs Corp., White Rock Bottling Co. of Arizona, and Applegate Realty & Investment Co. He also is director of H. M. Byllesby & Co., Phoenix Towers Corp., Casualty Development Corp., and A. B. C. Ranch Properties.

Weeks told the Journal last week the plan could be put in operation within 8 months after enough companies agree to it.

It can be activated, he said, when three or more oil companies with combined annual credit sales of $180,000,000 or more decide to participate.

Company costs . . . While the maximum cost would be 4% of gross sales, it might be less, Weeks said.

After the first year, he said, companies would pay a pro rata share of all expenses plus 1% of sales slips processed.

After total sales exceed $200,000,000, the 1% figure would drop to .75%. It would drop to .5% when sales topped $500,000,000. The proposed contract provides that participating companies would absorb bad-debt losses.

Most credit cards would be issued for 1 year. Some marginal credit risks would receive only 6-month "probationary" cards.

Customers would be billed in envelopes bearing the names of the selling company. Daily deposits would be made to company accounts.

If the plan is accepted by the companies, Weeks said, four or five processing centers will be established.

The credit company would ask to borrow at least one credit man from each participating company for a 3-month or longer transition period.

Sinclair Is Fighting New Wyoming Tax

WYOMING'S mandatory 5-mill property tax—a new levy assessed only in school districts which have no high schools—is being challenged by Sinclair Oil & Gas Co.

The tax was passed by the last legislature to pay transportation and other expenses of students who reside in school districts which have no high schools. There are 90 such districts in Wyoming. The students travel to the nearest high school.

Sinclair says the tax would cost the company $66,877 in school district 25 in Sweetwater County. There are only 13 high-school students in the district. Sinclair says its payment is $59,272 over what it costs to send the 13 students to the nearest high school, which is in Rawlins.

This excess is divided among Sweetwater County's four high schools, although none is in district 25.

Sinclair's tax runs high in district 25 since the company's properties are valued at 98.7% of the district's assessed valuation.

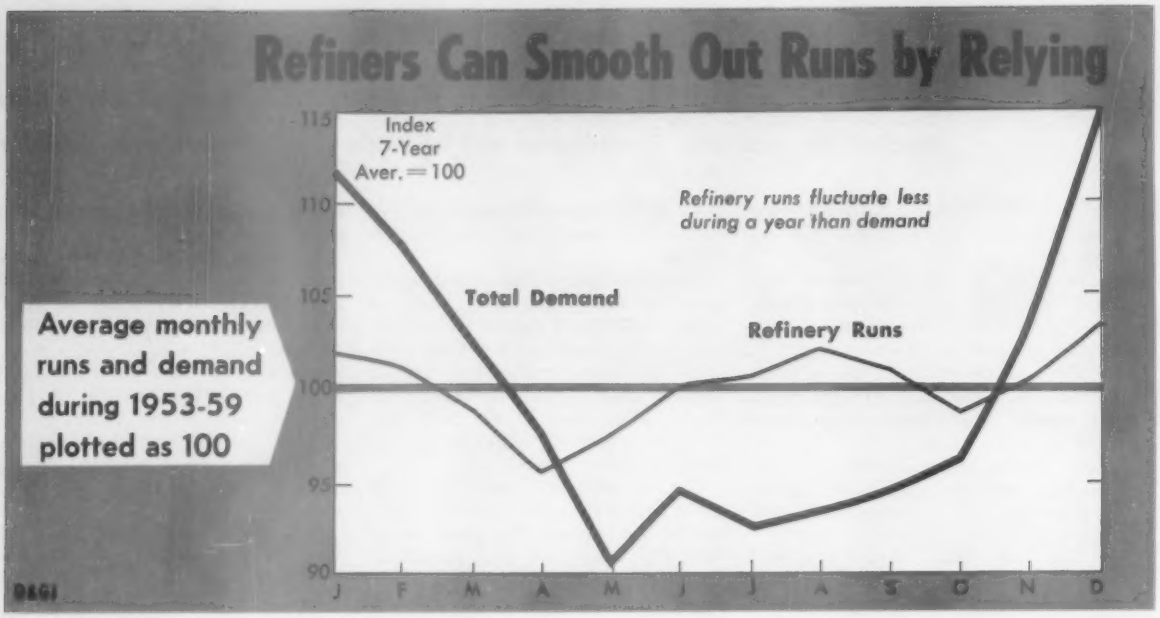
Previously, expenses of high-school students in areas with no schools have been paid from regular school funds, which are derived from state school tax limited to no more than 6 mills and a county school tax which can't exceed 5 mills. The new tax provides revenue over and above these laws.

Sinclair claims the new tax is not flexible because it makes it mandatory for county commissions to levy a 5-mill tax even though the revenue may exceed the need.

The company is challenging the constitutionality of the new law in a suit at Green River, Wyo. The suit claims property owners are being taxed to help carry the burden of taxpayers in other school districts.

School officials of Wyoming sponsored the law and urged its passage. The Wyoming Education Association and the Wyoming School Trustees Association supported it.

Many other taxpayers, including oil and pipeline companies, will be affected by the Sinclair suit. In some of the 90 districts with no high schools, tax payments under the new law probably will be paid under protest, leaving an opening for suits for refunds if the law is declared unconstitutional.



Refiners Are Moving Toward Steady

• The trend is to meet fluctuations in demand from inventories rather than increasing runs. This requires more storage, but adding storage is cheaper than carrying reserve refining capacity. One danger is inherent in this trend: Some refiners may feel inventories get too high and dump products on the market at depressed prices.

DOMESTIC refiners are paying less attention to seasonal changes in demand in planning their year's refinery runs.

The trend now is to operate plants at a more constant throughput over the year.

Advantage in this approach reportedly is reduced processing cost.

But the danger naturally lies in building excessive inventories and thereby depressing product prices. This means current refinery operations call for careful attention to:

. . . **Increasing storage** capacity for off-season products to prevent forced dumping, or

. . . **Changing yields** to fit seasonal demand.

If the refiner expects to keep refinery runs at a near-constant level and to take care of variations in demand through stock changes, he will have to add enough storage space to provide a safety factor. If he expects to keep storage capacity at present levels, he will have to adjust runs to meet seasonal changes in demand.

The alternatives are constant runs and overflowing storage which depresses the market and trims the refiner's already thin profit margin.

Cost motive . . . Refiners who advocate the near-constant rate of throughput base their ideas on two facts.

It's cheaper to build storage than it is to carry a big reserve in refining capacity. Processing costs per barrel also are reduced all along the line when runs are kept steady.

The additional storage capacity needed will allow the refiner to stock up on a product during its off season. Then during the peak season he can pull down on storage instead of jumping up runs. Abnormal demands can be met from products carried as reserve storage, and these reserves can be replaced by runs planned for the following year.

Such an approach may sound strange to the average refiner who already has more surplus processing capacity than storage. His mistake is a tendency not to use the processing capacity to gain flexibility but to shift runs only when tanks are brimming full. Thus he must get flexibility from the additional storage capacity.

Even so, the average refiner will want to make some shift in refinery yields between seasons. The big demand for heating oils during winter months is not completely offset by a drop in demand for gasoline. So if runs are to be kept constant, any seasonal difference in demand can be covered by a combination of stock changes and shift in yields.

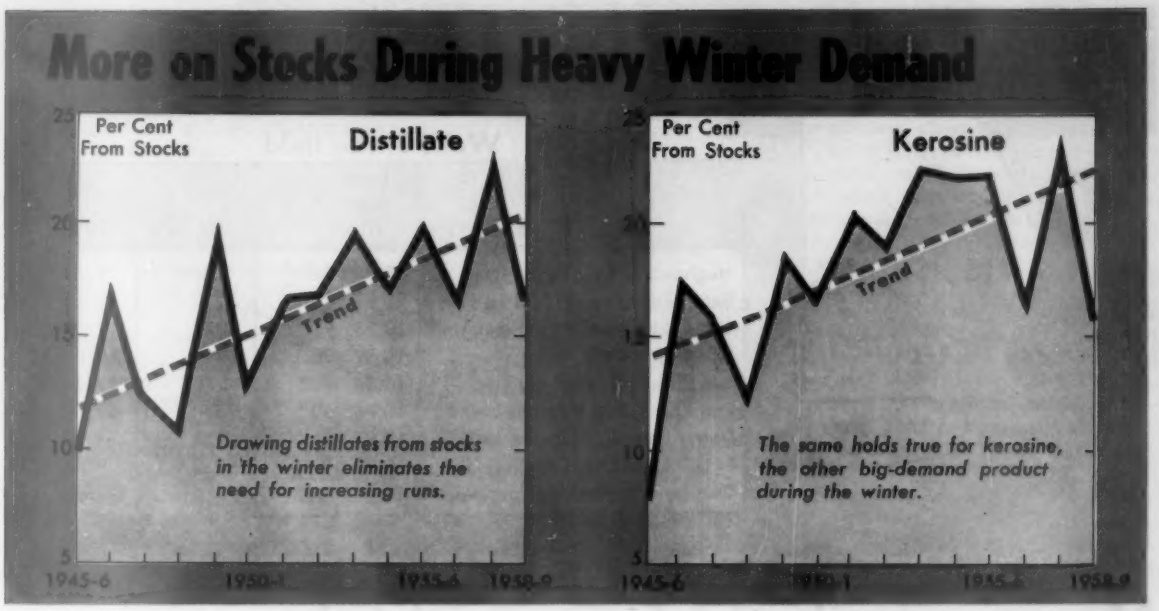
How it happens . . . Several indicators point to a more even demand pattern for the coming years.

This is a major factor making possible steady refinery runs.

The trend for distillate demand is a good example of the changing pattern. Two things are influencing the supply-demand balance of these light fuels:

. . . **Demand is not growing** now as it did in the years before 1952.

For the 20-year period 1932-52,



Runs Year Around

average annual gain in demand for middle distillate was about 9%. Since 1952, the average has been less than 4%, and for the last 3 years, gains have been running less than 2%.

. . . **Inventory buildup** in summer months is growing for distillate and kerosine.

This buildup permits refiners to meet a portion of winter demand from inventory. The percentage of winter demand thus supplied is growing (see chart). The trend line shows this growth at a glance. On this adjusted basis, inventory reduction covered about 13% of demand in the 1945-46 winter and climbed to more than 20% last winter.

Kerosine shows the same general trend, although this has been influenced in recent years by inclusion of straight kerosine sold as jet fuel. Starting with data for 1960, the Bureau of Mines will footnote jet-fuel kerosine sales each month to distinguish them.

The outlook . . . These trends indicate a gradual shift toward a refinery pattern with less attention to seasonal changes in demand and to a constant rate of refinery operation.

Winter demand still is greater than summer and has been accounting for increasingly larger portion of the year's total. But the gains are slowing down.

If distillate fuels continue to lose markets to natural gas, this trend will level out and may even start back down again.

This reverse shift actually has happened to refinery runs.

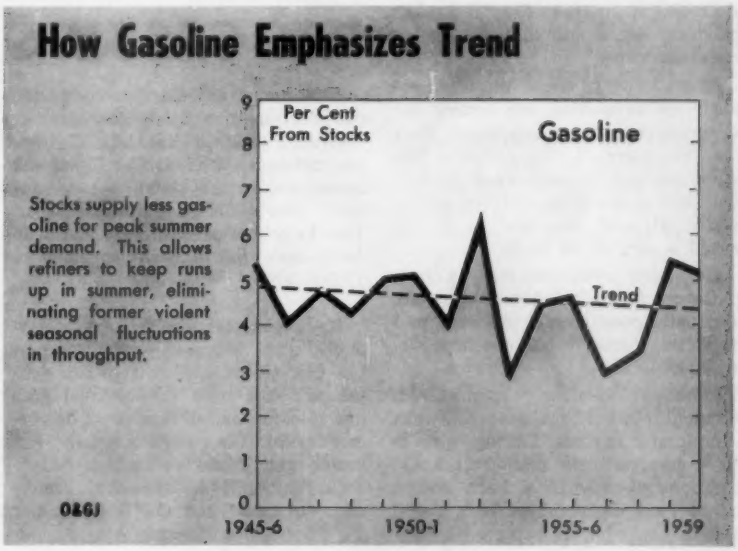
Winter runs averaged a little less than summer runs for the years 1947 and 1948. These years, however, were abnormal because refiners were not able to deliver enough refined products to meet demand.

Refining capacity caught up with demand in 1948, and for a few years refiners increased runs more during the winter season than for the summer.

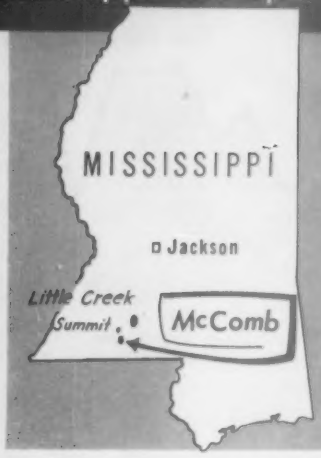
Since a peak in 1952, the winter-summer ratio of crude runs has declined slightly. For 1958, average refinery runs for the first and fourth quarters of the year topped the average for the two summer quarters by only 1.6%.

This variation in seasonals for demand and refinery runs shows up vividly if overall averages for the last 13 years are compared.

Total crude runs for the winter quarters since 1947 average only 1% more than runs during the summer quarters of these years. Total demand for petroleum products for the same period shows a winter-over-summer gain of 11.9%.



Mc COMB FIELD: Mississippi Hot Spot



Wells in the field

Operator, Well	Comp. Depth (Ft.)	Potential	
		Bbl. Daily	Choke
Hughes-Sun Oil, 1 Pope Unit	10,882-86	230	9/64
Sun Oil-Hughes, 1 Andrews	10,875-88	233	9/64
Sun Oil-Hughes, 1 Andrews Unit	10,882-90	340	11/64
Sun Oil, 1 Katie Gillis	10,891-88	310	10/64
Sun Oil, 1 W. F. Sinclair	10,882-902	286	12/64
Sun Oil, 1 Earl Johnson Unit	10,945-50	370	19/64
Dorris Ballew, 1 Holmes Unit	10,979-11,001	331	11/64
L. D. Elam, 1 Cook-Sells	10,934-50	358	9/64
George Harrison, 1 Supervisors	10,961-83		Testing

Mississippi Field Gaining Stature

• Two extension wells expand limits of McComb field north and west. Drilling campaign shapes up so fast there's a shortage of rigs.

Neil Williams
Associate Editor

MISSISSIPPI's fast-growing new McComb oil field rapidly is taking on the appearance of a large-size producing area.

It's one of the state's most important discoveries of recent years.

Two new extension wells more than a mile apart have just extended the field's productive limits more than 2 miles west at one place and a mile southwest at another. They follow an extension last month of more than 2 miles northwest.

At least two of these, the west and northwest extensions, are among the top producers so far completed. They had flow rates of 358 and 330 bbl. of oil per day through small chokes. Each had as much as 20 ft. of net effective oil sand, the most so far reported in any of the wells.

The third extension well, a mile southwest from the main field, may be equally good. It still is testing and productive capacity has not been determined.

Although less than 5 months old, the field already has nine oil wells without any failures. Drilling now is under way on eight additional wells. Locations already have been staked for at least eight others in a rapid buildup for what is expected to become the state's most active field-development program since Little Creek.

Rig shortage . . . Further drilling is being held back some by a shortage of rotary rigs in the state.

Most rigs in Mississippi are committed to other jobs. One operator in the field is moving a rig in from Texas.

The discovery well, completed August 10, was drilled by J. Willis Hughes as a joint operation with Sun Oil Co.

The 2-mile northwest extension well, completed in November as the area's third producer, was drilled by a group headed by Dorris Ballew. He is an active Mississippi operator and drilling contractor who recently became chairman of Loffland Broth-

PROCESSING BRIEFS . . .

Continental Oil Co. has completed construction of a $3-million catalytic reforming unit at its Lake Charles, La., refinery. Bechtel Corp. was the contractor on the 11,000-bbl.-per-day unit. Work started early this year. The Lake Charles refinery, built in 1941, now has a daily capacity of 53,000 bbl.

Research work on petroleum products and processes for Standard Oil Co. (Ind.) and two of its subsidiaries has been consolidated into one research and development department within the parent company. Research will center at Indiana Standard's Whiting, Ind., laboratory. American Oil and Utah Oil Refining are the subsidiaries affected. Also, chemicals research for Amoco Chemicals and Pan American Petroleum will be moved to the new department. Pan Am will continue exploration and production research in Tulsa. (For personnel changes, see Personals.)

Celanese Plastics Co. will expand the capacity of its Houston plant from 40 million to 50 million pounds per year of Fortiflex high-density polyethylene. Completion is planned for March, 1960.

Texaco Inc. has completed work on a sulphuric acid type alkylation unit at its El Paso refinery. The unit has a design capacity of 1,600 bbl. per operating day. Construction on the unit started last February.

ers Co., Tulsa. Completion of this well touched off the start of a series of other wells in that vicinity.

Also, Ballew's extension producer is only 2 miles south of the budding Summit field, with no direct defining limit between them.

Summitt field, opened earlier this year by Larco Drilling Co., produces from the same sand section as McComb. Four of the eight wells drilled there so far have been failures, but three of these have been northwest and north of the four productive wells. The other is off the southeast side, leaving the direct intervening area between Summit and McComb clear for drilling and possible linking.

Familiar pattern . . . Discovery and early development at McComb is following the pattern of Little Creek field, less than 8 miles northeast straddling the Pike - Lincoln county line.

Little Creek, opened by Shell Oil Co. 2 years ago in January, started off like McComb with a succession of long extensions following its discovery. This brought a rush of new drilling over a wide area.

Little Creek field now has more than 130 wells with sharply restricted production above 20,000 bbl. daily.

Both Little Creek and McComb produce from Lower Tuscaloosa sands of lower Upper Cretaceous age at comparable depths. At Little Creek, the pay is 10,750 to 10,800 ft. At McComb, the pay runs 150 to 200 ft. deeper.

On the basis of wells so far completed, McComb field does not have quite as much net effective oil sand in the reservoir as Little Creek. McComb wells also have slightly lower potential flowing capacities. Flowing pressures are somewhat higher, running 1,000 to 1,600 psi. through choke sizes varying from 12/64-in. down to 9/64-in. Gas-oil ratios, running 1,000 to 1,360 cu. ft. per barrel, also are a little higher. Gravity of the oil in both fields runs 38° to 42°.

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Alberta Nominations Hit Peak

PRODUCERS of Alberta oil will get off to a good start in 1960, with refiners asking for more crude oil in January than any single month in the past 2 years.

The Alberta Oil and Gas Conservation Board reports that refiners' nominations total 436,484 bbl. daily. This is 54,247 bbl. daily more than the December take of 382,237 bbl.

All areas but one in which Alberta oil is refined will take more crude in January than December. The only area to be off slightly is Manitoba, and it is only 3 bbl. daily under the December figure.

Total exports to the U. S. will be up about 5,000 bbl. daily. The U. S. South will take 100 bbl. daily; U. S. Puget Sound, 49,000 bbl. daily, and U. S. Great Lakes, 19,200 bbl. daily.

Alberta refiners will take about 2,500 bbl. daily more than in December, asking for 57,729 bbl. per day.

B. C. pipeline oil deliveries will be up about 20,000 bbl. daily, with the refiners in that area asking for 77,470 bbl. daily. Also to be served by pipeline is the Saskatchewan market area, where 52,540 bbl. daily—a 11,000-bbl. increase—will be processed.

Ontario refiners, served by pipeline, will take about 16,540 bbl. daily more, asking for 156,350 bbl. daily.

Manitoba will take 15,619 bbl. daily by pipeline.

The largest single purchaser of Alberta oil in January will be Imperial Oil Ltd., asking for 129,500 bbl. daily. British American Oil Co., Ltd., is next with 73,805, and Texaco Exploration Co., third with 57,200.

Carter Oil Co. has bought Lincoln Oil Co., a distributor of petroleum products in the Lincoln, Neb., area. The purchase includes eight service stations and a bulk plant in Lincoln, and several stations in surrounding communities.

Synthetic - rubber consumption in the U. S. in 1959 amounted to a record 65.5% of total rubber demand, due mostly to higher crude rubber prices. This percentage should be even higher in 1960, predicts J. Ward Keener, B. F. Goodrich president.

A polypropylene plant, with an annual capacity of 20-million pounds, will be built in Longview, Tex., by Texas Eastman Co. The plant will use a process invented in Eastman Kodak Co.'s laboratories. Completion is scheduled in the last quarter of 1960. Last September, Eastman began small scale commercial production of polypropylene.

Production of hydrochloric acid, for acidizing of wells, has begun at the Pine Bluff, Ark., plant of Arkansas Louisiana Chemical Corp. Equipment installed this fall will produce 6,000 tons annually. The company, a subsidiary of Arkansas Louisiana Gas Co., leased parts of the U. S. arsenal in Pine Bluff in 1958. The acid also is used as a chemical cleaner in refining operations.

Louisville Refining Co., Louisville, Ky., an affiliate of Ashland Oil & Refining Co., is increasing its refining capacity to 8,700 bbl per day by the addition of pumps and heat exchangers.

Also for Refiners . . .

IN THE NEWS: Free world refining capacity up 4.2% during year despite fact number of refineries is down (p. 70) . . . Refiners are paying less attention to seasonal changes in demand in planning their year's refinery runs (p. 74) . . .

PLUS THESE TECHNICAL REPORTS: Expanded Lacq processing plant will put France in the sulfur-export business (p. 138) . . . Tanker surplus keeps growing (p. 164) . . . Shell's first gasification plant is a commercial success (p. 174).

1960 Will Be a Busy Year for Oil in

Clyde La Motte
Washington Editor

THERE CAN BE little doubt that 1960 will be a big year, and an important one, for the oil and gas industry in Washington.

It will be the new year of a new decade, and decisions that will be made during that year will have a far-reaching impact throughout the remainder of the decade—and beyond.

In the box at right are only some of the decisions to be made in 1960, or very shortly thereafter in this new decade. Each is in the precedent-setting category, helping to tailor the future of oil.

Because of such importance, they deserve a close study. Here's a rundown of the major areas of importance which will be up for scrutiny in Washington next year.

1. Imports

Few people doubt that the import-control program is here to stay during the foreseeable future. Almost equally certain, however, is the likelihood that it will undergo considerable change. And soon.

At least one major oil company is already set to challenge the legality of the program, contending that the company has not been permitted to maintain its historical position in the imports picture and that its rightful share is being chipped away even further to make room for "newcomers."

Aside from the legal challenge, the Oil Imports Administration faces some tough problems involving residual fuel oil imports, District 5 crude-oil import standards, and newcomers to the product import picture.

It has met these problems thus far with temporary expedients, but there is considerable doubt that those expedients can long survive.

In both the residual-fuel situation and the District 5 crude-oil allowable, the OIA finds itself in the unenviable position of trying to foresee the supply-demand future and to change the quotas in advance to meet the needs.

If, in this guessing game, it sets the quotas too low, there is the danger of a short supply and higher prices. This would touch of an immediate, and loud, outcry.

On the other hand, if it sets the quotas too high, the influx of residual fuel on the East Coast or crude oil into District 5 could only depress markets and, in effect, defeat the long-range aim of the program to assure a strong and healthy domestic industry.

Many observers feel that the only logical way out for the OIA is for it to establish a broad framework of limitations and leave to the industry the reponsibility of adjusting supply to changing demands.

Regarding products, the tough job facing OIA is to come up with a workable definition of what constitutes "undue hardship."

The recent revisions of the import rules permit firms which did not import products during the base year (1957) to apply for an import quota now if they can prove they are facing excessive hardship as long as they are kept out of the imports picture.

There will undoubtedly be some stormy aftermaths to such decisions the appeals board will make during 1960.

Efforts will also be made in 1960 to get the OIA to change its periods of allocations.

Some industry men feel the allocations should be made for a year at a time, instead of 6 months. This, they say, would give companies a better long-range picture and avoid the uncertainties of 6-month changes.

If the switch to 1-year allocations is not made, some plan to propose that OIA switch to a seasonal, rather than a calendar, division of the year. They would group the last 3 months of one year with the first 3 months of the next year to form one 6-month period and would combine the second and third quarters into the other 6-month period.

The argument is that such a change would fit better into normal industry seasonal patterns.

2. Natural Gas

The pending FPC action in the Phillips case is one of tremendous importance to both the oil and gas industries.

In this one, the FPC must establish the basis for determining prices to be paid at the wellhead.

The U. S. Supreme Court dumped this tough problem into FPC's lap with its historic decision June 7, 1954. Since then, the commission has been struggling for a solution, and 1960 will likely become the showdown year.

The ultimate decision will have a long-range impact.

If the formula tends to keep gas prices low, the result could have a depressing effect on the oil industry.

If the formula tends to let gas prices rise, gas-consumer groups are certain to make an issue of it.

But the Phillips case is far from being the only knotty problem confronting the FPC. The commission must make precedent-setting decisions on a wide variety of other questions, including proposals to eliminate "favored nation" and "spiral escalation" clauses in natural-gas contracts (OGJ, Nov. 23, p. 41).

The FPC must also decide whether deductions for percentage depletion and intangible drilling costs can be made when a company is determining federal income taxes to be included in its cost of service for rate-making purposes.

It must decide whether a pipeline company which has its own production is entitled to the fair field price for its own gas or whether only the actual cost of this gas can be used in the rate base.

And, sometime during 1960, it will decide on how strong an appeal it will make to Congress for legislative answers to some of its most pressing problems.

Some observers feel that the best hope the industry has for a new gas bill is that the FPC will eventually tell Congress that the commission is finding it impossible to regulate properly under existing law.

That undoubtedly would help set the stage for new natural-gas legislation.

It appears likely that no major drive for a new gas bill will develop in 1960. However, industry segments will continue to search for proposals on which they can present a united front to Congress by 1961.

3. Taxes

No major changes are expected in 1960. Percentage depletion may undergo some hit-and-run attacks, particularly in the Senate, but no revision is likely.

Most major tax decisions will await the eventual outcome of the over-all tax study being made by the House Ways and Means Committee.

That committee plans to spend all of 1960 studying the complex tax problem and isn't likely to make specific proposals until 1961 or later.

Regardless of its findings and proposals, there is little reason to expect much, if any, tax relief in the decade

ahead. The opposite—increasing tax burdens—is more likely.

True, the committee is seeking ways of broadening the tax base to help provide a healthy, thriving economy. But government spending appears destined to continue to climb, and the money must come from taxes.

There is, for example, the federal highway program. The Commerce Department will complete a study during 1960 on who benefits from such road building and who should contribute to the cost. This may spread the burden over a slightly wider base, but only an extreme optimist could translate this to mean that taxes such as those on motor fuels will be reduced. If anything, they are apt to rise again and again during the 1960's.

4. Policy Changes

As the Government gets more and more involved with oil and gas industry regulation, the "climate" established by major government policy decisions becomes more and more important.

Such projects as the seldom-mentioned study now under way by the Government to anticipate the nation's oil needs in 1975 become significant because they could lead to an effort to align the industry to a foreordained pattern.

This particular study, under the Office of Civil and Defense Mobilization, is due for completion in 1960. If it is adopted in top government circles it undobutedly will influence government decisions in the years ahead.

And it would be unwise for the oil industry to underestimate the efforts of the coal industry to shape resources policies to give coal a better break at oil's expense.

5. Congress

The usual forecast for an election year is that Congress will make considerable noise but pass no major legislation which would materially change existing conditions.

For oil specifically, there will likely be some legislation affecting mineral uses of public lands. For the most part, this will be an effort to update leasing policies, and it will probably follow the pattern of legislation introduced last year but shelved when Congress adjourned.

Meanwhile, the Government will probably step up its campaign against leasing violations, particularly where evidence indicates that companies have circumvented the acreage limitations.

The Interior Department will also consider opening new areas for leasing, including the desert game range in Nevada.

Congress will also discuss proposed legislation to encourage investments abroad. At the same time, however, the use of percentage depletion in oil operations abroad may come under attack again.

There will be suggestions that Congress take over the imports-control program, but it is doubtful that Congress will want to vote such a problem of regulation into its own hands. It is wiser, politically, to stay out of such fights and let someone else bear the brunt of any criticism.

Congress will probably be asked to raise the tax on motor fuels to avoid a cutback in the road-building program. If there appears to be danger of a downturn in economic conditions, a step-up in the road-building rate might be used as a pump primer.

Congress will also discuss further labor legislation, but it is unlikely to go further than it did in 1959.

Political moods can change quickly, especially in an election year, so any present estimate of the path Congress may take must undergo constant study and change.

As one oil-industry representative in Washington put it: "It's always best to expect the worst and be prepared for it than to get caught unprepared."

What to Expect in Washington

- The imports-control program will face some major adjustments in 1960—and a fight over the legality of some aspects is almost certain to be taken to the courts.
- The Federal Power Commission must decide what to do about the Phillips Case, and thereby try to set a pattern for the regulation of producer prices of natural gas.
- The industry will try to set the stage for one more all-out effort to get Congress to enact workable, feasible legislation for natural-gas regulation.
- The United States Supreme Court will make its offshore boundary decision.
- Important tax policy proposals will be drafted by the House Ways and Means Committee, although no action may be taken for another year or two.
- A special government study group will prepare recommendations on the highway program, particularly on the financing of the plan.
- Another high-ranking government group will submit its views on the long-range outlook for oil. These views could go a long way in shaping government policy.
- The coal industry will step up its push for action which would curtail certain oil and gas uses in order to make more room for coal.
- The Federal Trade Commission will rule on the legality of the merger of Gulf Oil Corp. and Warren Petroleum Corp. Meanwhile, the Justice Department will put even more emphasis on its own anti-merger activities.
- The Interstate Commerce Commission will rule on lower rail rates for coal, thereby possibly opening the way for coal to invade more residual fuel oil markets in the East.

Why Do Oil Firms Move to Houston?

• It's easier to give reasons against rather than for moving to Houston: The climate leaves a lot to be desired; it's not the geographical center of the oil business; Dallas is still considered oil's financial capital. Why then is Houston booming? Here's a look at the factors which are pulling more and more oil men to this Gulf Coast metropolis.

Howard Wilson
Gulf Coast District Editor

TAKE the force of a snowball that builds and feeds on its own momentum.

Add to it the herd instinct—the attraction of the species to its own kind.

Mix these with such natural advantages as geography and raw material, and you have Houston, the boomingest big-city oil center in the world.

You can cite a number of reasons why Houston shouldn't be booming:

... **Its muggy climate** often makes summers miserable. A lot of people just don't want to move there.

... **Hurricanes** are a threat, and flood waters rush through the flat city streets with every heavy rain.

... **It's nowhere near** the geographical center of the U. S. oil industry. And it's hundreds of miles from the eastern and northern population centers that use much of its products.

... **It isn't even** the financial center of Texas. Dallas still holds that title.

Why, then, is Houston still growing in stature as an oil center?

The reasons are many. But the one which motivates oil men more than any other lies in the very nature of the industry—integration, and the dependence of one oil man on another.

Houston's amazing oil growth got its start basically because of (1) the presence of oil and gas in the area and (2) the foresight of early civic developers who built the ship channel and made Houston a major port a generation ago.

These factors made possible what happened later.

When World War II produced the impetus for building new processing plants and the first big cross-country transmission lines, Houston gained a momentum of industry development that hasn't slackened.

The latest ... Within the past year or two a host of companies either have switched their headquarters to Houston or enlarged their Houston operations. And more is on the way.

No one, not even the Chamber of Commerce, has been able to keep track of the statistics on the companies and people flowing into the city. Here, at least, are some of the big ones:

... **Humble Oil & Refining Co.,** which makes Houston its home under the new Jersey Standard merger.

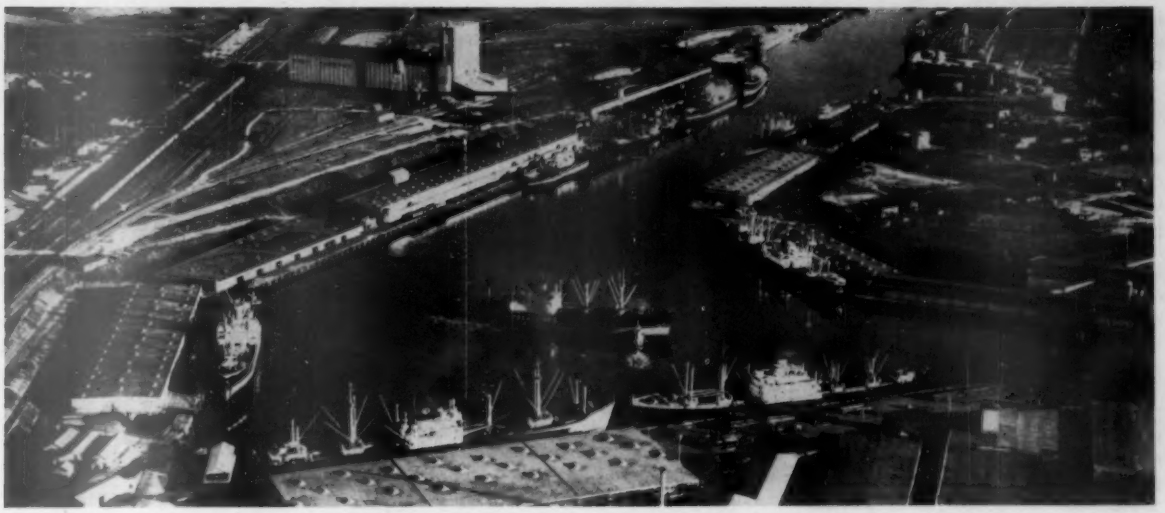
... **Gulf Oil Corp.,** which moved its domestic production and manufacturing headquarters to Houston this year and, a couple of years ago, did the same with pipelining.

... **Texaco Inc.,** which will move its manufacturing offices to Houston from New York early next year when its new 16-story annex is completed.

... **Mobil Oil Co.,** which closed out Magnolia Petroleum Co. and picked Houston as headquarters for its largest exploration and producing division.

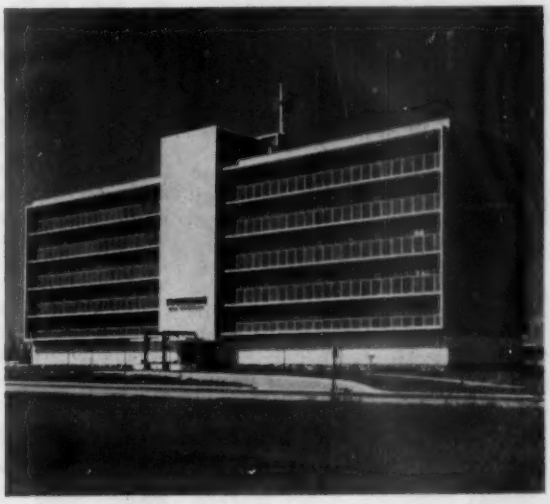
... **Texas Eastern Transmission Corp.,** which has moved most of its executive offices from Shreveport.

... **Tidewater Oil Co.,** which com-



HOUSTON'S SHIP CHANNEL is one of the city's biggest assets. It gives Houston cheap water transportation, which has pulled refineries to the area. And as the area grew as a refining center, it attracted other related oil installations.

HUMBLE'S new 44-story building, superimposed in this aerial photo, will make a big change in Houston skyline.



GAS TRANSMISSION lines have been flocking to Houston. Trunkline Gas Co. recently moved into new headquarters.

bined its southern and central divisions into one division at Houston.

... **Sunray Mid-Continent Oil Co.,** which opened a Gulf Coast division office at Houston.

... **Transwestern Pipeline Co.,** which chose Houston as headquarters for its Texas-to-California pipeline.

Shell Oil Co. has not increased its already-huge Houston operation, but the Humble, Gulf, and Texaco moves have sparked rumors that Shell officials in New York also are taking a hard new look at Houston.

Other growth . . . The publicized expansion by major companies does not, however, represent Houston's real growth as an oil center.

For example, when Continental Oil Co. moved to Houston in 1950, only 60 persons were added to the regional office staff of about 165. Today Continental has about 550 Houston-based employes.

Shell, with 6,000 persons in Houston and Harris County, has grown 35% in personnel in the past decade.

The same is true of scores of other companies, whose gradual growth is not reflected in public announcements.

No one has produced an accurate count of the oil companies and oil people in Harris County. One estimate puts the figure at about 2,000 companies in oil and related businesses.

Herd instinct . . . Houston started with a good foundation—3.1 billion barrels of proved reserves on the Texas Gulf Coast and pipelines to tie it in with billions more.

Its second big asset has been the ship channel. Houston worked for many years making the city a world port by deepening and widening Buffalo Bayou and its seaward approaches. In 1915 the ship channel docked its first big ocean-going craft —and the city became a deepwater port.

Today the channel is 51.7 miles long, will be deepened from 36 to 40 ft., will be widened from 300 to 400 ft., has a turning basin 1,300 ft. in diameter, and is lined with some 80 docks.

But the big push to Houston has been prompted by other things, too.

A survey of oil men turned up a variety of reasons for the city's grow-

ing stature in oil. Most of them had a common denominator: "One thing builds on another."

"When industry in general locates in one place, it tends to draw others —especially in the fuels industry," says the head of a major oil company division. "Also the big basic industries tend to develop where water transportation is available.

"We have the raw materials, and we locate refineries along the coast, where we can get the crude in and the refined products out. With refineries here, they pulled in the petrochemicals industry."

An economist put it this way: "Houston is raw-materials oriented, not market-oriented. But we have the deepwater transportation to ship the products to the larger consuming areas. We have the stuff in the ground, and it makes sense to locate plants here. And when you get a concentration of plants here, it makes sense for management to locate here."

The pipelines . . . While no city can claim to be "the" headquarters of any single segment of the widely scattered oil industry, Houston comes closest as a transmission center.

Seven of the biggest long-line companies headquarter in Houston. And virtually all of this has developed since, or during, World War II. More important, these are growth companies, whose expansion has been meteoric.

Tennessee Gas, Transcontinental, Trunkline, Columbia Gulf Transmission, Texas Eastern, Coastal Transmission, Transwestern—all were youngsters 15 years ago—if they existed.

Transwestern, virtually a paper company heretofore, is now building its line to California and gathering a big new staff to do it.

Coastal Transmission, another newcomer which has helped to build a line to Florida, now has 150 persons on the payroll.

Tennessee Gas, an "oldtimer," tells perhaps the best growth story of all. Starting with a handful of employes in 1943 and a contract to build a line from Texas to West Virginia, it has since become a $1.3 billion corporation that is still expanding. It now employs 5,300 persons, of whom nearly 2,000 are in Houston.

Distance, too, is no barrier to the Houston-based companies. Tennessee Gas has FPC approval to move Canadian gas into the upper Middle West. And Anchorage Gas Corp., a new company, will move gas from Kenai peninsula to Anchorage.

The long lines are diversifying, too. Several already are substantial drillers, producers, refiners, and marketers.

Processing . . . By the fortunes of geography and geology—and with an able assist from the ship channel builders — Houston has become not only the hub of oil development in South Texas and the Upper Gulf Coast but also the chief processor of the product.

The mushrooming growth during and after World War II made Houston and the area within a 100-mile radius the largest refining and petrochemical center in the country.

Because capacity caught up with demand, new construction has tapered off in the past couple of years. However, new units are still being installed, and some new plant construction is under way.

Humble is building costly polypropylene and ethylene plants at its Baytown refinery, and U. S. Industrial Chemicals has completed a polyethylene plant on the channel and is already doubling its capacity.

There's a current lull in development, but it's expected to end quickly as demand once again matches capacity.

The economics of processing on the Gulf Coast are fundamental: Plants along the coast can lay their products down in eastern seaboard ports more cheaply than plants located far from the raw materials and far from deepwater shipping.

Tankers are great equalizers.

Gulf Coast refiners—from the Mississippi to the Rio Grande — know they can depend on the raw materials from the gathering lines in the producing fields.

And the satellite petrochemical plants know they can always feed off the by-products of the refineries.

Supplies . . . The manufacturers and sellers of supplies to the industry long ago discovered Houston, but today they are concentrating more and more of their operations there to keep pace with local growth.

Houston's output (in dollar volume) of oil field machinery, equipment, and services is nearly 40% of the nation's total, three times that of its nearest competitor. The increase is up some 6% over 5 years ago, mostly at California's expense.

The upsurge in foreign drilling has contributed to this trend—because Houston has a port opening on Latin America.

Continental-Emsco Co. closed out its West Coast plant this year and enlarged its Houston plant.

Plicoflex also moved from California to Houston and built a plant. W-K-M Division of ACF Industries built a new plant 2 years ago, and Southwestern Industrial Electronics Co. built one this year.

Among others which have expanded their plant operations in Houston are Mission Manufacturing, Tex-Tube, Cameron Iron Works, and Oil Center Tool.

Lane-Wells Co., a service company, moved its headquarters from Los Angeles to Houston 2 years ago.

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watching WASHINGTON

Clyde La Motte

• Exit Brown; enter Jameson, Jones . . .

WITH THE START of the new year, two men will move to the center of the stage of the Washington operation of the Independent Petroleum Association of America.

They are Minor S. Jameson, executive vice president of IPAA, and L. Dan Jones, counsel for the organization.

It will be entirely understandable if they blink a little at the unaccustomed spotlight. For 30 years Russell Brown has been "Mr. IPAA" in Washington. Jameson and Jones, during their years with the association, have quietly done their work in the background.

Now, with Brown retiring at year's end, Jameson and Jones will be out front.

It will take a bit of getting used to for all concerned. The Washington operation itself will have to adjust to a Brown-less scene. And members of IPAA, who over the years had gotten into the habit of generally leaving

Several suppliers, such as Baker Oil Tools, have beefed up their Houston sales offices, and two Japanese steel companies have established offices in the city with an eye on the tubing market.

The gas men . . . The natural-gas industry is a prime example of the tendency of an industry to "follow the crowd."

Houston got a head start as a pipeline headquarters because of the heavy gas reserves in South Texas and the Gulf Coast.

But the basic reason for the city's dominance is man-made: Gas is bought and sold in Houston, no matter where it is located. The big producers are in Houston, and they must be consulted.

"You need to go to the oil company itself to buy the gas," said one transmission company official. "You need to locate where the folks you're doing business with live."

This type of thinking no doubt influenced Transwestern, the newest long-liner, to set up shop in Houston, although its source of supply is located in West Texas and the Panhandle, and its line runs from there to the West Coast.

Too, the engineering firm which designed the line is in Houston. And it's there because that's the home of most of its clients and its prospects.

It is no surprise the pipeline contractors and consultants are concentrating in Houston, where the pipeline companies are located.

The oil men . . . The average oil man would blanch at being called a "togetherness" fellow, but this modern-day cliche aptly describes him.

Oil men want to be together—if not for the society of one another, at least to exchange ideas, and certainly to make the deals and trades essential to their business.

Moreover, he feels confident of decisions made close to the base of operations.

"We're here because this is the geographical place to be," said one major company official who recently came to Houston from the East.

"We wanted to get our operating people away from the policy people," he continued. "More important, there was the economics of the thing—the necessity for cutting costs by becoming more efficient. We had to put our operating people close to where the work is being done, so they could see the problem and make a decision on it."

The paradoxical trends of both centralization and decentralization in the oil business also have contributed to Houston's boom. Centralization, such as the Humble and Mobil mergers, has resulted in new prestige for the city which was already an oil center.

Decentralization, under which division offices often disappear and new authority is given smaller offices on the district level, has strengthened the remaining division offices or the headquarters. Gulf's reorganization of its exploration and production department, for example, raises the status of the district offices, which, in turn, often report directly to headquarters at Houston.

Other "Why's" . . . The oil, the port, and the herd instinct are not the only magnets pulling oil business into Houston.

Companies which decide to move into Texas are fully aware that Texas has no state income tax or general sales tax. The state government has a reputation for being stable and conservative—in contrast, for example, to Louisiana, its more flamboyant neighbor and competitor to the east.

Houston has a growing labor force that is well paid and reasonably stable. And the state also has a right-to-work law which reduces labor union authority in basic industries.

Even the argument that the market for products is too far away is losing steam. Houston and Texas are building one of their own. Harris County's population was 115,000 in 1900, had risen to 806,000 by mid-century, and today is estimated at better than 1,200,000. The city of Houston will hit close to the 2 million-mark in the 1960 census.

But these are side factors. They do not explain why Houston has more than 1,000 oil producers and operators, more than 1,000 companies providing supplies and services to the industry, and more than 100,000 persons drawing their paychecks from oil and allied industries.

It all gets back to the raw materials, the ship channel, and "togetherness."

Washington problems to Brown, will have to tailor their thinking to a new set-up.

In a sense, Jameson and Jones face something of an evaluation period in which they will have to prove themselves.

Fortunately, each is an old hand at IPAA business. Jameson joined the organization in 1937 as a petroleum economist. Jones is a veteran of more than 13 years in the Washington shop, and has been serving as assistant general counsel.

Too, they are accustomed to working together as a team. For the most part, Jameson has concerned himself with the economic and administrative end of the Washington work load while Jones has dealt primarily with legal and legislative matters.

However, their efforts frequently merged on a given project so that each is familiar with just about all phases of the Washington work.

IT IS INEVITABLE that there will be some change, now that Brown is leaving. This is likely to be a gradual evolution, however, rather than any sudden switch.

Jameson will do most of the report letters to the membership, although he will confer closely with Jones in their preparation.

Those letters have become somewhat of a Russell Brown trademark, but Jameson will try to keep them as vigorous and as positive as Brown did. That is, he will seek to leave no doubt about his view on issues arising in Washington.

The new team faces a big job in building up as close a relation with individual members as Brown had done in his long tenure. As a step in this direction, Jameson and Jones will be on the road a great deal in the beginning.

THE JAMESON touch is likely to show most clearly in matters of economics, since that is his particular specialty.

For example, one of the first major projects of the association will be to make a thorough study of the oil industry's present economic status, and what needs to be done to strengthen it.

This will involve a close look at the impact of current import controls. But it will also include examination of other factors, including industry practices.

You may expect to find Jameson giving more and more emphasis to the need for a full industry approach to many problems which at times in the past were considered problems of only one segment of the industry.

In the final analysis, it isn't likely that either Jameson or Jones will emerge as the dominating figure that Russell Brown became. Perhaps that wouldn't be possible—or even desirable—in the present era when "rugged individualism" has in most instances been replaced by the teamwork approach.

Even so, the eyes of Texas—and other producing states—will be on Jameson and Jones in the days ahead.

Texas Sticks With 10-Day Allowable

• Railroad Commission hearing is short and routine, except for questioning of Texaco official about Loiusiana crude imports into Texas. Texaco says imports up, but not as much as Texas exports on a percentage basis.

TEXAS will hold the line on its crude production in January.

State producers will start off the new year on a 10-day producing pattern, the same as for December.

The calendar day allowable, set by the commission December 18, will be 2,888,110 bbl. This is up 13,575 bbl. daily from the allowable in effect December 5, but down 16,515 bbl. daily from December's initial allowable.

Purchasers showed wide support for the commission's January decision. Only four of the 12 asked for a different pattern. Of these Humble, Magnolia, and Texaco sought 11 days, while Indiana Oil Purchasing (still strike plagued) nominated for only 9.

ALLOWABLES BY DISTRICTS

District—	January	Change from Dec. 5
1. Southwest	48,161	+ 126
2. Gulf Coast	116,328	+ 578
3. Gulf Coast	379,985	+ 289
4. Southwest	193,464	+ 247
5. East Central	31,035	+ 74
6. Outside East Texas Field	120,179	+ 840
6. East Texas field	143,024	+ 145
7-B. N. Central	165,445	+ 318
7-C. W. Central	138,550	+ 2,164
8. West Texas	1,163,367	+ 3,900
9. North Texas	250,869	+ 5,071
10. Panhandle	137,703	— 177
TOTAL	2,888,110	+13,575

Louisiana imports up . . . About the only departure from strict hearing routine was an extensive questioning by the commissioners of J. C. Edwards of Texaco on that company's imports of crude from Louisiana. Texaco was asked by the commission at the November hearing to bring figures on this phase of its operations.

Edwards told the commission that Texaco's imports of crude from Louisiana had indeed gone up—but not as much, on a percentage basis, as its crude exports to other states.

The Texaco official placed company imports from Louisiana at 173,249 bbl. daily in October this year, as compared with 130,176 bbl. in October 1958—an increase of 33.1%. Meanwhile, he said, Texaco's crude exports increased from 79,738 bbl. daily to 125,428 bbl. daily during the same period, for an increase of 45,690 bbl. daily or 57.3%.

William J. Murray, Jr., commission member, asked why Texaco is bringing more crude into Texas for refining. Edwards suggested that it was because the oil is available there.

Stocks in line? . . . Buyers of Texas crude again submitted reports on their actual and desired levels of crude and products stocks—this time as of December 1.

Again, the figures showed no great surplus, in contrast to estimates given last March which would make present stocks 50,000,000 bbl. too high.

Stocks figures given by 15 reporting companies this time excluded that needed for pipeline fill and below tank outlets. They showed that crude inventories of the 15 companies totaled 94,450,000 bbl. This was about 2,317,000 bbl. below the composite desired level.

Gasoline in storage, the only excess product, totaled 111,522,000 bbl. against a desired 111,361,000. Six of the companies were long on gasoline, six short, and three in balance.

Kerosine stocks totaled 32,075,000, against 33,706,000 desired.

Distillate total was 98,714,000 bbl., against 101,860,000 desired.

And residual in storage was 27,902,000 bbl., against 29,118,000 desired.

Leasing Act Change Sought

PROPOSALS to amend federal mineral leasing regulations have been made by Interior Secretary Fred Seaton.

The purpose is to protect bona fide purchasers of leases, options, or interests in leases which may have been acquired by others in violation of acreage limitations.

The rules would specify that bona fide purchasers would be dismissed from any proceeding with respect to any violation of the Mineral Leasing Act, and for the extension of the lease of any person whose rights under the lease were either voluntarily waived by him or were suspended by the Department of Interior.

PIPELINE BRIEFS . . .

An 80-mile 20-in. line is planned by Northern Natural from East Dubuque, Ill., the present eastern terminus of its line, to Janesville, Wis. At Janesville, Northern proposes to deliver 75,000 M.c.f. per day to Michigan Wisconsin Pipe Line Co., which would be a new customer. Gas would be sold in the Detroit, Milwaukee, and Madison areas. Beginning of deliveries is proposed for November 1, 1960.

Modernization of the Bayou Pipe Line products system, running from the Houston area to Baton Rouge, La., is planned by Service Pipe Line Co., which on January 1 will take over operation of Bayou from Shell Pipe Line Corp. Service will start early in 1960 to install control, telemetering, safety, and monitoring equipment and remote-reading tank gages. When the program is completed, Hankamer and Fannett, Tex., stations will be controlled from the Baytown, Tex., terminal. The Buhler, Basile, and Cortableau, La., stations will be controlled from Port Neches, Tex., terminal.

A merger is planned by Oklahoma Natural Gas Co., an intrastate company with assets of some $170 million, and Northern Oklahoma Gas Co., which serves Ponca City, Newkirk, and Perry. Northern's subsidiary, Kay County Gas Co., buys and produces natural gas. Northern has recommended to its stockholders the acceptance of Oklahoma Natural's offer to exchange four shares of its common stock for five shares of Northern common. Oklahoma Natural serves a population of 1,200,000 and Northern 40,000.

Calco Loses Bid to Kill Colorado Tax

• Appeal to U.S. Supreme Court may be made now that Colorado's highest court has upheld the state's gross income tax on oil and gas production.

THE COLORADO Supreme Court has upheld the legality of Colorado's gross income tax on oil and gas production.

By a 6-1 vote the court rejected an appeal of The California Co. against the levy and saved the state refunding nearly $20 million.

H. C. Teasdel, president of The California Co., declared an appeal may be taken to the U. S. Supreme Court. Decision on this possibility will be made as soon as possible, he said, in order to minimize the financial impact on the state.

The California Co. in its appeal contended the tax discriminated against the oil industry because a graduated gross income tax denied due process and equal protection guaranteed by the 14th Amendment of the U. S. Constitution.

The oil company also claimed the tax law illegal because it is a special tax on property, exceeds the scope of its title, and imposes an unwarranted burden on interstate pipelines.

Justice Albert T. Frantz in the majority opinion said that singling out one group of citizens for special taxation does not violate either the U. S. or Colorado constitutions if the tax applies equally to all members of the same class of taxpayers.

The majority opinion also pointed out the tax may qualify as a net levy rather than a gross levy because it allows deductions for ad valorem taxes on local property.

The court also held the tax is an excise measure—not a levy on property. It defined the tax as "an excise on the privilege of producing and extracting within the state, measured by the amount of sales."

The Colorado court did order one refund on that part of the tax collected on production between January 1, 1953 and March 27, 1953, holding it "retrospective" taxation. The law went into effect March 27, 1953. The refund will not exceed $200,000 for the entire industry, state revenue department officials estimated.

British Columbia Land Leased

A CROWN reserve auction in British Columbia netting $3,917,151 in bonus bids, fees, and rentals established Boundary Lake oil fields as the hottest spot in the search for British Columbia oil.

A newcomer to the B.C. oil business paid $1,098,448 for gas and oil leases in the Boundary Lake region of northeastern B.C. Amerada Petroleum Corp. paid more than 25% of the money involved in the Crown sale.

A record price of $811 an acre was paid by Dome Petroleum, Ltd., for 652 acres in the same area. It paid $528,704 for the acreage.

The lowest price per acre was $2.50 by West Canadian Oil & Gas, Ltd., which paid $253,000 for 96,368 acres of wildcat land in northwestern B.C.

Another highlight of the auction of 326,035 acres of exploration permits, drilling reservations, and natural-gas leases was the sale of 652 acres in the Boundary Lake oil field at a bonus bid of $461,888 to the Ohio Oil Co.

Mines Minister Kenneth Kiernan said one reason for the upsurge in interest in the Boundary Lake area, 600 miles northwest of Vancouver, was the recent announcement that a pipeline to take oil to Vancouver and other markets will be built before next fall.

The B.C. government, which held three Crown reserve auctions in 1959, now plans to hold four a year. The next is scheduled for March 1960.

Addition of 500 billion cubic feet in gas reserves with facilities costing $5,834,000 is planned by Transwestern Pipeline. Transwestern has asked the FPC for an early decision on its application to permit construction of new lines by contractors now laying the 1,809-mile system from Texas to California. Additional gathering lines are planned in the Texas and Oklahoma Panhandle areas, West Texas, and New Mexico.

Transfer of properties and assets of Texas Illinois Natural Gas Pipeline Co. to Peoples Gulf Coast Natural Gas Pipeline Co., a new wholly-owned subsidiary of Peoples Gas Light & Coke Co., has been approved by the FPC. Peoples Gulf Coast later is to be merged with Natural Gas Pipeline Co. of America, Peoples Gas Light's other transmission subsidiary.

Deliveries of Interprovincial Pipe Line Co. this month are expected to increase by 64,673 bbl. daily over November to 370,883 bbl. daily. Projected crude deliveries are 208,307 bbl. daily for Ontario refineries, 70,705 bbl. daily for export to the United States, and 91,871 bbl. daily for Western Canada.

Transcontinental Pipe Line has awarded the construction contract on 23 miles of 30-in. looping in South Louisiana to Williams Brothers. The job, in two spreads, is located on Transcontinental's main line in Calcasieu Parish near Starks and in Allen Parish near Reeves.

A trillion-cubic-foot gas reserve in the Big Piney area of Wyoming has been purchased by Pacific Northwest from Belco Petroleum Corp. Two contracts are involved. One covering 300 billion cubic feet goes into effect July 1, 1960, and one covering 700 billion cubic feet goes into effect January 1, 1962. Initial price is 18½ cents per M.c.f. with 1-cent increases at 5, 10, and 15 years. Belco will realize about $200 million from the contracts plus $17 million from liquids which El Paso will extract under a separate contract.

A West German steel and pipe-manufacturers' combine reports it is building three products lines in Egypt. Two are kerosine lines, 70 miles from Suez to Cairo and 14 miles from Alexandria to Kafr-el Dawar, and the third will pump fuel oil from Alexandria to Tanta, some 68 miles. The pipe order to Phoenix-Rheinrohr-International G.m.b.H. and Mannesmann-Export G.m.b.H. totaled $15 million.

A 300-mile gas-transmission system is proposed by Quebec Gas Transmission Lines, Inc., Montreal, from Montreal to Quebec City, with branch lines to various cities. The $20-million project would take gas from Trans-Canada Pipe Lines, Ltd.

PHOTOS IN THE **NEWS**

A Costly Blowout

A HIGH PRESSURE South Louisiana well blew out last week, throwing gas, mud, and sand 300 ft. into the air and then caught fire. At left the well is pictured when it bridged over temporarily, but by night (right) the blowout was going full blast again. Fire destroyed the derrick before Paul N. (Red) Adair, Houston fire fighter, brought the well under control. The well had been drilled to 17,500 ft. by Loffland Brothers Co. for Ernest Cockrell, Jr., Houston independent, on a lease near Patterson, La. Bottom-hole pressure at time of blowout was estimated at 15,000 psi.

Offshore 'Private Eye'

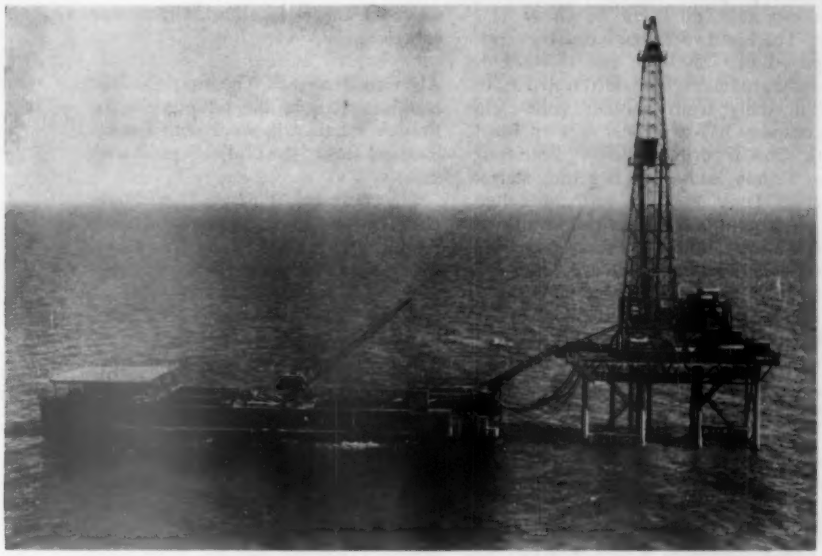
A METAL fish that does detective work on the ocean floor is being lowered into the Gulf of Mexico. Shell Oil Co. uses it to track down oil-gathering lines off Louisiana.

Coastal waters have more than 350 pipelines—all of them in danger of being smashed by well jackets or dredging machinery. Spotting these lines always has been difficult until J. L. Arbogast and Dr. C. H. Fay of Shell Development Co. came up with their 6-ft., 200-lb. device.

The machine generates an electromagnetic field. When this field is disturbed by presence of a pipeline, the information is flashed to a shipboard recorder. The equipment is calibrated to show depth of the line's burial to the accuracy of 3 to 6 in.

Tank Test for Tankers

AN ESSO RESEARCH engineer adjusts the mooring mechanism during laboratory tank test of a 60-in.-long tanker model which is shown riding out swells simulating ocean waves 15 ft. high. Test provides data for designing moorings and piers for tankers.



Rig Hired Out to Japs

A RIG and tender of Seacat Offshore Drilling Co., S.A., will kick off 2 years' work soon for a Japanese firm, Arabian Oil Co., on a Neutral Zone offshore concession. The rig and tender will be used with a small fixed platform owned by Arabian Oil.

Drilling has been resumed, meanwhile, by International Drilling on another wildcat for Arabian Oil after the shallow gas formation that blew out last July finally was cemented off. Contractor reentered the hole last month, recovered a fish, cleaned out the hole, and set 13⅜-in. casing at total depth of 1,510 ft.

Road to Qatar

TWO TUGS are shown towing the "Seashell," a new $5-million mobile platform, to its first location at Doha Bay, Qatar, where it will drill a 7,000-ft. well for Shell Oil Co. of Qatar (OGJ, Dec. 21, p. 64). The platform replaces one wrecked in a sudden storm 3 years ago.

Jersey Expanding Libyan Holdings

- Libyan American farms out acreage to Esso. It includes Block 17, which has two discoveries.
- Other companies also are active. Several key wells are either drilling or testing.

JERSEY STANDARD is expanding its interests in Libya with a farmout on some of the concessions held by Libyan American Oil Co.

The Libyan Government has approved an agreement between Esso Libya and Libyan American in which the Jersey subsidiary can earn 51% interest in acreage that includes discovery Block 17. Esso can earn the interest by spending an amount equal to the Libyan American investment reputed to be about $8 million.

Libyan American has completed two producing wells on Block 17, a concession in north-central Libya adjoining Oasis Oil Co.'s Block 32 on the west. The wells are Mabruk 1, which produces 1,200 bbl. daily of 40°-gravity crude from 5,700 ft. and Zahalin 1, which yields 900 bbl. daily of 39°-gravity oil from 9,228 ft.

Libyan American is an affiliate of Texas Gulf Producing Co. and W. R. Grace & Co.

Best Oasis well . . . The latest development well on Oasis Block 32 was completed as a far better producer than any other well on the concession.

The F-2 flowed at the rate of 8,000 bbl. daily on the final production test. The well had initially tested 2,800 bbl. daily. But it later yielded 3,100 bbl. of 43°-gravity oil on a 3-hour test. Oasis is the operator in Libya for concessions held by its parent, Ohio Oil Co., and for other members of the Conorada group. The partners are Continental Oil Co. and Amerada Petroleum Corp.

Oasis is by far the most active driller in the country with a total of 10 rigs either making hole or rigging up. Four of the outfits are in Block 32, where one deep test, H-1, is running logs at 10,649 ft.

A discovery in western Libya on Oasis Block 26 is drilling ahead at 9,890 ft., and a second rig is being set up. On the opposite side of the country, two wells are getting started on Block 33, bordering Egypt. Two wildcats are in progress on Block 59 in Cyrenaica. This acreage lies on the south side of Esso's Block 6, where Zelten field is located.

Other programs . . . Esso is drilling ahead at 5,280 ft. in Zelten 4.

The first two Zelten wells were completed as 17,500-bbl. and 15,000-bbl.-daily producers. The third tested 1,600 bbl. daily from another zone. The company has two other rigs on Block 6. One is drilling below 10,660 ft. at Tedma, and a well is getting started at Et Tual. Both lie north of Zelten.

Amoseas is starting a third on Block 47, where Beda 1 tested 3,650 bbl. daily. Production tests are being carried out on the first stepout, B-2. The B-3 is drilling ahead at 385 ft.

Libya Shell has two wells in progress. A stepout to the Bir Tlacsin discovery on Block 70 is drilling ahead at 4,050 ft. A wildcat on Block 40 is down to 2,793 ft. Bunker Hunt is drilling a test on Block 2 in Cyrenaica, but lost circulation at a shallow depth is causing trouble. Mobil Oil is drilling ahead at 7,025 ft. in Block 13 in Cyrenaica and has a wildcat in progress in Tripolitania.

British Petroleum has started a test on Block 37 in eastern Libya. The French company, CPT(L), has two wildcats under way in Block 24, which lies north of Block 32. Gulf Oil has one rig making hole in its discovery Block 66, and another rig is on the move to a new location in the same concession.

Algerian deal . . . The first German company to join the oil play in the French Sahara will work with French partners near the Edjele producing area.

The company, Wintershall, will have 35% interest in an exploration on a permit at Sekaifaf held by Francarep, which also will hold 35%. Another 10% will be held by Petropar, a government oil investment company. Carep, an Algerian government company, will hold the remaining 20%.

FOREIGN BRIEFS . . .

A PHILIPPINE wildcat on Panay Island has tested 5 million cubic feet of gas daily from two shallow zones. The gas flowed at an estimated 600 psi. from 2,100 ft. and 2,200 ft. The well has been bottomed in basement below 7,000 ft. San Jose Oil Co. and Philippines Oil Development Co. (PODCO) are drilling Tagbauan 1 as a joint test. PODCO has 70% interest in the license and San Jose 30%.

Phillips Petroleum Co. is designing a carbon-black plant for Showa Denko, K.K., Japan. It will use Phillips' process for making oil furnace black and should be in operation within 2 years.

An outside firm will be hired to tackle the problem of increasing ultimate recovery from Creole Petroleum's Jusepin field. The company will employ Core Laboratories, Dallas, to make a study of possible recovery methods in the eastern Venezuelan field. The Ministry of Mines and Hydrocarbons has agreed to the project. The ministry said present producing methods would recover only an estimated 191 million barrels or 14% of the oil in place. The field produces about 9,000 bbl. daily.

Russia says it has brought in a second flowing well across the Bering sea from Alaska. The wells are near the Chazhma river on the Kamchatka peninsula. Natural gas recently was discovered in the same area.

Delhi Australian Petroleum has officially tagged its first Australian wildcat as dry. The test, the 1 Innamincka in northeastern South Australia, was drilled to a total depth of 12,580 ft. as a joint operation with Santos, Ltd., and the so-called Frome Group. It

Iran Builds Pipeline

... in order to move crude to Kermanshah refinery.

NATIONAL Iranian Oil Co. is adding a 4-in. pipeline which will enable existing plants in west-central Iran to turn out more products.

When the project is completed in May, the new pipeline will carry crude from Naft-i-Shah field to Kermanshah refinery. The 2,500-bbl. plant at present does not take crude directly from the field. Rather, it processes a mixture of light distillates, benzene, kerosine, and gas-oil that arrives through a 3-in. pipeline from a 5,715-bbl. field topping plant.

The 4-in. line will parallel the 3-in. Part of the 4-in. is already in operation carrying a mix of residuals and some light ends to a terminal at Kalantar. The mix is marketed in the immediate vicinity as fuel oil.

A 110-mile extension of the 4-in. from Kalantar to Kermanshah is in the ground, but four pumping stations along the entire length of the system must be completed before all the line is ready for service. A new cooling tower also is being added to the Naft-i-Shah topping plant.

When the project is completed, Naft-i-Shah will make finished products, which will be delivered to Kermanshah in batches through the 3-in. system. This supply, plus products refined directly from crude at Kermanshah, will double the products available for distribution from Kermanshah.

The program will help meet expanding demand within Iran. While local consumption is a small fraction of the million-barrel-daily crude production, the home market of 54,000 bbl. daily the first 9 months of the year was up 17.7%.

Algerian Line Contract Let

A CONSTRUCTION contract has been awarded for the first section of a 327-mile 24-in. pipeline from Algeria's big Hassi R'Mel gas field to the Mediterranean.

The line will initially serve local Algerian industries. But several plans are under study for eventual transport of the gas to Europe. Proved reserves of the big field are estimated at 17 trillion cubic feet, with probable reserve of 28 trillion cubic feet (OGJ, Aug. 24, p. 62).

Contract for the first section of the system has been awarded to Groupement Enterprose-Ste. Parisienne pour l'Industrie Electrique (GREP). It will lay a 200-mile link from Hassi R'Mel to Tiaret.

Deep Negev Test Planned

A GAS discovery in Israel's Negev Desert has spurred plans for more wildcatting in the same area.

Israel Negev Petroleum Corp. will start a deep test soon 12 miles south of a small commercial find at Zohar. The well will be drilled jointly with Naptha Israel Oil Co., which is developing the gas field. The companies have pooled leases covering 50,000 acres adjoining the find, and will start the new well in January.

Four Zohar wells drilled to date have tested 9 million cubic feet daily of natural gas containing 97% methane, according to Douglas Ball, Denver, consultant for Israel Negev. Probable rserves in Zohar are estimated at 30 billion cubic feet. The Israeli Government plans an 18-mile 4-in. pipeline from the field to a potash plant on the Dead Sea.

Sahara Pipeline Loan Made

THE WORLD Bank has granted a $50-million loan to help cover the cost of the new pipeline from Hassi Messaoud oil field to the Mediterranean.

The 12-year loan will cover nearly half the cost of the $105-million, 412-mile 24-in. system. It was made to Ste. Petroliere de Gerance, a pipeline company formed by the operators of Hassi Messaoud, SN Repal and CFP (A).

Amortization will start May 15, 1961, with an interest rate of 6% per year. Payments are guaranteed by the parent companies and by the French Government. The rest of the financing for the system is being taken care of by stockholders through stock issues and long-term loans.

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was completed as a water well following testing of several zones between 4,000 and 7,000 ft. The rig has been moved to a new location to drill the 1 Betoota in southwestern Queensland.

The first Russian portable gas-turbine electric power plant designed to operate on casinghead gas is being tried out in Stavropol fields. The experimental unit has a capacity of 300 kw.

Nortex Oil & Gas Corp. has been granted a concession on about 12,000,000 acres of land in eastern Queensland, Australia. It borders Australia's northeast seacoast and extends south to Maryborough, north of Brisbane. A wholly-owned subsidiary, Nortex Australian Oils, Ltd., will begin geological exploration on the concession in January.

Brazil and Russia have signed a $200 million trade agreement under which the Soviet Union will ship crude, products, oil equipment, and wheat to Brazil in exchange for coffee and other products. Equipment and oil will be the main Brazilian imports with coffee being the chief product sent to Russia.

The largest pipeline in Britain has been completed and tested. The 60-mile 18-in. line will carry up to 700,000 bbl. daily of crude from Angle Bay, at Milford Haven, Wales, to British Petroleum's Llandarcy refinery. All signs of the line have ben carefully erased on the route through densely populated areas. It is buried at a minimum of 2 ft.

An Algerian wildcat drilling ahead about 65 miles east of the Moroccan border is the first to be started in the Sahara by Soc. Des Petroles de Valence. British Petroleum has half interest in the company.

Sunset International and Tradewinds Exploration have spudded their second wildcat on Portuguese Timor north of Australia. The well is about 1½ miles northwest of the first test, which was abandoned at 6,700 ft. after an unsuccessful fishing job for stuck pipe. The two companies have half interest in a 7,000-sq.-mile concession. The other half is held by Timor Oil, Ltd., an Australian firm.

A second plant to make town gas from poorer grades of coal will be built in Britain at Coleshill, in the West Midlands. The $25-million project based on the Lurgi process will open in 1963. It will be larger than a plant under construction in Scotland using the same process (OGJ, Nov. 16, p. 142).

Russia plans to complete more than 3,726 miles of gas, crude, and products pipelines next year. Capacity of many existing lines also will be expanded by the installation of gas-turbine pumping stations.

World-

SUMMARY OF JOURNAL SURVEY

COUNTRY	Page No.	RESERVES Proved bbl. (1,000's)	WELLS Producing 7-1-59	WELLS Drilling 12-1-59	PRODUCTION Daily, 1959 (1,000's)	PRODUCTION % Change from 1958	REFINING No. oper. refrs.	REFINING 1,000 BPSD as of Jan. 1, 1960 Crude	REFINING Cracking	REFINING Reforming
Austria	106	250,000	769	19	45.5	−14.8	7	46.5	11.3	.....
Belgium	107	.....	.....	.....	.....	.....	7	170.7	26.5	25.2
Denmark	115	.....	.....	.....	.....	.....	2	0.5	.....	.....
Finland	114	.....	.....	.....	.....	.....	1	25.0	15.4	3.4
France	107	200,000	461	43	29.9	9.1	14	769.2	118.2	122.8
West Germany	109	500,000	3,635	130	98.6	14.1	24	572.7	99.9	90.5
Greece	111	.....	.....	.....	.....	.....	1	30.0	.....	8.2
Ireland	116	.....	.....	.....	.....	.....	1	40.0	.....	9.0
Italy (incl. Sicily)	112	300,000	113	36	30.0	4.9	34	773.0	67.5	121.2
Netherlands	113	200,000	362	3	33.6	8.8	2	359.0	106.0	37.7
Norway	115	.....	.....	.....	.....	.....	1	2.0	.....	.....
Portugal	114	.....	.....	1	.....	.....	1	22.9	10.6	.....
Spain	114	.....	.....	8	.....	.....	2	145.5	2.0	25.0
Sweden	114	.....	.....	.....	.....	.....	4	47.8	1.0	11.8
United Kingdom	115	6,000	232	5	1.7	.....	14	962.6	127.8	124.5
Yugoslavia	117	40,000	230	....	11.0	24.6	3	10.1	.....	.....
Total Europe		1,496,000	5,802	245	250.3	....	118	3,977.5	586.2	579.3
Algeria (incl. Sahara)	131	5,000,000	19	40	21.5	129.0	.....	.....	.....	.....
Angola	137	25,000	16	3	0.9	.....	1	2.2	.....	.....
East Africa	132	.....	.....	4	.....	.....	.....	.....	.....	.....
Egypt	132	500,000	229	5	58.0	−4.0	3	87.2	2.7	7.9
French West Africa	137	.....	.....	2	.....	.....	.....	.....	.....	.....
Gabon	137	150,000	89	7	14.5	57.7	.....	.....	.....	.....
Libya	133	1,500,000	.....	24	.....	.....	.....	.....	.....	.....
Morocco	133	8,500	87	3	1.9	26.7	1	2.1	1.8	.....
Moyen Congo	137	10,000	.....	2	.....	.....	.....	.....	.....	.....
Nigeria	134	80,000	27	9	11.0	93.0	.....	.....	.....	.....
South Africa	134	.....	.....	.....	.....	.....	1	25.0	13.0	4.1
Tunisia		.....	.....	1	.....	.....	.....	.....	.....	.....
Total Africa		7,273,500	467	100	107.8	....	6	116.5	17.5	12.0
Australia	124	1,000	.....	3	.....	.....	6	237.0	76.0	37.2
British Borneo	125	500,000	494	2	112.0	4.2	1	46.0	.....	.....
Burma	125	45,000	264	5	10.4	18.2	2	9.4	1.5	.....
Formosa (Taiwan)	125	500	53	1	0.04	.....	1	28.0	14.0	2.5
India	126	525,000	579	5	9.0	5.9	4	112.3	29.8	10.5
Indonesia	126	9,000,000	2,250	8	338.0	4.0	5	273.8	57.0	15.0
Japan	128	50,000	2,723	15	7.4	4.2	23	640.1	57.2	26.1
New Guinea (incl. Papua)	130	28,000	43	2	4.4	−13.7	.....	.....	.....	.....
Pakistan	130	25,000	.....	5	5.9	.....	1	6.0	.....	.....
Philippines	130	1,000	.....	2	.....	.....	1	22.0	7.5	.....
Total Australasia		10,175,500	6,406	48	487.14	....	44	1,374.6	243.0	91.3

Wide Oil Report

The summary tables on these pages, and the country-by-country detailed tables and discussions on the following 44 pages, present the Journal's annual year-end roundup of oil and gas activity throughout the world, excluding the United States and Canada. This year, instead of regional maps of the principal oil and gas areas of the world, the Journal gives you a wall map of the Mediterranean area. It is inserted separately in the issue. This roundup was prepared by the Journal's International Editor Paul Swain, and District Editor Ray Gibson.

COUNTRY		RESERVES	WELLS		PRODUCTION		REFINING			
	Page No.	Proved bbl. (1,000's)	Producing 7-1-59	Drilling 12-1-59	Daily, 1959 (1,000's)	% Change from 1958	No. oper. refrs.	1,000 BPSD as of Jan. 1, 1960 Crude	Cracking	Reforming
Argentina	92	2,000,000	4,375	99	130.1	27.0	14	238.4	87.4	3.3
Bolivia	93	94,000	79	11	8.7	−8.4	4	12.2	.....	.....
Brazil	94	250,000	561	42	66.3	28.8	8	156.3	66.3	.....
British Honduras	105	.....	.....	1	.....	.....	.....	.....	.....	.....
Colombia	95	750,000	2,054	28	145.0	12.6	5	51.2	60.8	.....
Chile	95	65,000	141	5	17.7	17.2	1	24.0	9.5	4.0
Cuba	96	2,600	195	1	0.5	−44.5	6	86.9	24.5	10.9
Ecuador	97	24,000	1,629	4	7.7	−10.5	2	7.4	.....	.....
Guatemala	105	.....	.....	3	.....	.....	.....	.....	.....	.....
Mexico	98	2,500,000	2,221	120	264.0	2.3	8	357.0	87.0	.....
Netherlands West Indies	105	.....	.....	.....	.....	.....	2	680.0	478.0	20.0
Peru	100	325,000	2,973	9	48.4	−6.9	3	49.2	20.8	.....
Puerto Rico	105	.....	.....	1	.....	.....	2	83.7	82.4	7.5
Trinidad	101	425,000	3,169	31	112.0	9.3	3	182.0	53.0	8.5
Uruguay	101	.....	.....	.....	.....	.....	1	28.0	2.0	.....
Venezuela	102	18,000,000	9,384	66	2,700.0	3.7	14	886.0	118.5	19.8
United States		33,500,000	580,240	3,350	7,043.0	5.0	291	10,250.0	6,728.0	2,160.0
Canada		4,590,000	16,018	220	508.1	12.0	43	920.0	548.0	162.0
Total W. Hemisphere		62,525,600	623,039	3,991	11,051.5	....	407	14,012.3	8,366.2	2,396.0
Aden	122	.....	.....	.....	.....	.....	1	120.0	.....	12.0
Bahrain	117	225,000	145	....	45.2	11.0	1	186.5	63.2	10.5
Iran	118	35,000,000	93	10	920.0	12.0	3	495.0	35.0	81.0
Iraq	119	25,000,000	85	6	830.0	14.1	6	55.8	15.0	15.0
Israel	119	40,000	23	4	2.0	25.0	1	87.0	.....	20.0
Jordan	123	.....	.....	1	.....	.....	.....	.....	.....	.....
Kuwait	120	62,000,000	301	3	1,410.0	0.06	2	220.0	.....	4.0
Lebanon	123	.....	.....	.....	.....	.....	2	24.0	.....	1.4
Neutral Zone	121	6,500,000	122	5	116.0	40.7	1	50.0	.....	.....
Qatar	121	2,500,000	39	1	174.4	.....	1	0.6	.....	.....
Saudi Arabia	121	50,000,000	188	4	1,070.0	5.4	1	189.0	.....	41.5
Southern Arabia	122	100,000	.....	3	.....	.....	.....	.....	.....	.....
Syria	123	1,000	.....	2	.....	.....	.....	.....	.....	.....
Turkey	123	70,000	42	12	7.0	12.9	1	6.9	3.0	.....
Total Middle East		181,436,000	1,038	51	4,574.6	....	20	1,434.8	116.2	185.4
Total Free World		262,906,600	636,752	4,435	16,471.34	....	595	20,915.7	9,329.1	3,264.0
Russia and controlled areas		*30,137,000	.....	....	2,895.0	....	....	.....	.....	.....

*Includes (thousands of bbl.), USSR, 28,000,000; Romania, 1,000,000; Hungary, 200,000; Albania, 15,000; China, 750,000; Czechoslovakia, 12,000, and Poland 25,000.

Abbreviations used in the tabulations with this report

Cracking Processes:

FCC—Fluid cat cracking
TCC—Thermofor cat cracking
HD—Houdriflow cat cracking
Vis—Visbreaking
Plf—Polyforming

Other Processing:

A—Asphalt
Alky—Alkylation
BPH—BP Hydrofining
Cat—Atlantic Catforming
CH—Catalytic hydrodesulfurization
CR—Cat reforming
Fhy—Fluid Hydroforming
H—Hydrogenation
HF—Houdriforming
Hyd—Esso Hydrofining
Is—Butane isomerization
L—Lube manufacture
PD—Perco desulfurization
Pf—UOP Platforming
Poly—Polymerization
Pwr.—Esso Powerforming
Sf—Socony
C—Coke
T—Thermal Reforming
SB—Sinclair-Baker
Un—UOP Unifining
V—Vacuum distillation

ARGENTINA—Making solid progress

ARGENTINA is making solid progress in its all-out effort to solve its oil shortage.

Despite periodic political discontent, the government of President Arturo Frondizi appears to be in control. There has been no major delay in the programs of the state-owned YPF, or in the work of private companies with assorted types of drilling, development, and exploration contracts.

Crude production has risen about 120,000 bbl. daily. Most of the increase has been from fields operated by YPF, but growing output from fields being developed by private firms has already reached several thousand barrels daily. Declining fields in old concession areas held by Jersey Standard and Shell also contribute to the total.

The increased production enabled Argentina to import less crude during the first 9 months of the year. This could well be the turning point in the country's struggle to overcome its basic economic problems.

Pan American International (Indiana Standard) has had the fastest start of any of the companies working under contract. Pan Am completed 46 of its first 56 wells in Comodoro Rivadavia as producers. Output was held down to 5,000 bbl. daily only because of a lack of an outlet. Pan Am, L. R. Development Co., a Loeb Rhoades subsidiary, and other firms will invest a total of $224,000,000 over the next 6 years.

Among the other companies with programs are affiliates of Jersey Standard, Royal Dutch-Shell, Tennessee Gas Transmission, Union Oil Co. of California, and Kerr-McGee. Drilling contracts, either to YPF or private companies, are held by Loffland Brothers, Loughlin-Porter, Kermac, Petrotech, and Southeastern Drilling.

ARGENTINA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Condor, Avellaneda	900	.....	.....	.....	.....
Cia. La Isura, S.A., Bahia Blanca	2,000	1,000	.....	.....	.....
Diadema Argentina, S.A. de Petroleo, Buenos Aires	[1]23,000	26,000	.....	3,300 T	.....
Esso, S.A. Petrolera Argentina:					
Bahia Blanca	10,500	3,000 5,000 Vis	.....	.....	.....
Campana	[2]44,200	20,000 Vis	.....	.....	1,100 L, 1,250 A
Dadin (Plaza Huincul)	470	.....	.....	.....	.....
Manuel Elordi	1,580	.....	.....	.....	.....
Lottero y Papini-Avellaneda	750	.....	.....	.....	250 V, 250 L
Yacimientos Petroliferos Fiscales:					
La Plata	[3]112,000	20,000	16,000 FCC	.....	5,500 Alky, 530 L, 3,300 Poly
San Lorenzo	27,200	6,000	.....	.....	.....
Lujan de Cuyo	[4]14,800	2,000	.....	.....	.....
Dock Sud	6,400	2,700	.....	.....	340 L
Chachapoyas	3,600	1,200	.....	.....	.....
Plaza Huincul	2,700	500	.....	.....	.....
Total	250,100	87,400	16,000	3,300	

(1) Planned additions of 35,000-bbl. crude unit for completion early 1962. (2) Adding 24,200-bbl. crude unit, 10,000-bbl. FCC unit. (3) Adding 10,000-bbl. fluid cat cracker. (4) Planned expansion to include 28,000-bbl. crude capacity, 18,500-bbl. delayed coker or visbreaker, and 11,000-bbl. FCC unit, for completion late 1961.

ARGENTINA PRODUCTION
Chubut and Santa Cruz Provinces

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Comodoro Rivadavia, 1907	5,900	116	3,466	72,970	532,925,000	22.8-24.5
Neuquen Province						
Plaza Huincul, 1918	3,900	74	413	18,050	80,046,800	30.0
Salta Province						
Campo Duran and others, 1930	13,120	11	55	7,850	39,918,300	22.5-54.0
Mendoza Province						
P. Colorados, Barrancas and others, 1934	7,500	46	194	31,230	147,471,800	...
Total		247	4,128	130,100	800,361,900	

YPF still has unassigned exploration acreage, and contract negotiations with other companies are in progress.

Pan Am is building an 84-mile 12 and 14-in. crude-oil pipeline to the coast. A larger, natural-gas-pipeline system being built by YPF is scheduled to be completed at the end of this year. The 1,015-mile 24-in. line runs from Campo Duran, in northern Argentina, to Buenos Aires. Other projects include a planned 652-mile 10-in. products line from Lujan de Cuyo to Buenos Aires, and a natural-gas line to the same city from Comodoro Rivadavia.

BOLIVIA—A neighbor looks for oil

THREE PRIVATE Brazilian companies received permission from their own government this year to explore a concession granted years ago to Brazil by Bolivia.

Two of the companies have negotiated with U. S. firms for the actual work on their individual tracts. Uniao Brasil Bolivia de Petroles has signed letters of intent with Kerr McGee for engineering and management services on a 568,000-acre license north and east of Camiri. Petrolio da Bolivia has made an agreement with Keplinger & Wanenmacher, of Tulsa, for exploration work on a 485,000-acre tract north of the UBBP area. Parker Drilling Co. will be the drilling contractor.

Atlantic Refining this year acquired an option to earn 80% interest in a 235,000-acre concession held by White Eagle International north of Santa Cruz. Atlantic must drill a 10,000-ft. well by July 1961 to obtain the interest.

Two deep wildcats have been under way. Gulf Oil has taken its 1 Yoay to 15,257 ft. Chaco Petroleum, a subsidiary of Tennessee Gas Transmission, has been drilling ahead at 11,944 ft. in AGS-2, after sidetracking below 12,000 ft. TGT partners in the concession are Union Oil & Gas, Lion Oil, and Murphy Corp.

The government company, YPFB, has four rigs drilling field-development wells.

BOLIVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Yacimientos Petroliferos Fiscales Bolivianos:					
Camiri	2,000	...	...	...	...
Cochabamba	6,000	...	...	...	50 L[1]
Sanandita	250	...	...	...	...
Sucre	4,000	...	...	...	...
Total	12,250	...	...	...	

(1) Adding 100-bbl. lube plant.

BOLIVIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Bermejo, 1924	3,608	7	7	...	...	26-27
Camatindi, 1958	6,550	2	...	...	...	45
Camiri, 1927	4,528	47	14	...	...	56-59
Guairuy, 1947	2,788	11	...	...	...	54-59
Sanandita, 1926	3,116	...	12	...	...	42
Toro, 1955	4,100	14	...	...	...	21-54
Total		79	33	8,400	23,186,428	

*Estimated.

BRAZIL—Self-sufficiency still far off

BRAZIL'S state-owned oil agency, Petrobras, is making progress in solving the national oil shortage, but the day still seems far distant when the country may be self-sufficient in oil.

Local production was able to equal one-third of demand late this year when output reached 75,000 bbl. daily. This level is scheduled to jump to 100,000 bbl. daily at the end of the year when new offtake facilities are completed in Bahia fields, Brazil's only production.

Petrobras is still counting on developing crude production in the vast Amazon or some other basin. A total of 42 rigs have been running in drilling and exploration programs, including outfits on strat tests.

The government's refining industry also is expanding, and a new 42,000-bbl.-daily crude unit at Mataripe was being completed ahead of schedule. The unit was built to replace an old 10,000-bbl. unit, and the expansion included several downstream facilities.

Bahia crude has an unusually heavy wax content, and Petrobras swaps considerable quantities for cheaper imported crude that is more suited to its local requirements. In a two-way sales agreement made with Esso Export this year, Brazil will trade up to 28 million barrels of Bahia oil for 80 million barrels of Venezuelan oil. Gulf Oil Corp. has sold its local marketing subsidiary to a private Brazilian refiner and marketer. Gulf, in turn, acquired a long-term crude-supply agreement with the firm, Ipiranga.

BRAZIL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. de Petroleo da Amazonia, S.A., Manaus	5,000	.....	2,000 FCC	.....	.....
Destilaria Rio Grandense de Petroleo, Uruguaiana	300	.....	.....	.....	.....
Industrias Mafarazzo de Energia, Sao Paulo	500	.....	.....	.....	.....
"Ipiranga" S.A., Rio Grande do Sul	6,000	2,000	.....	.....	.....
Refineria de Manguinhos, S.A., Rio de Janeiro	10,000	4,500 Vis 2,800	.....	.....	.....
Refineria Uniao, S.A., Capuava	[1]31,000	.....	35,000 TCC	.....	8,000 V, 1,000 Poly
Petrobras, S.A.:					
Cubatao	[2]94,500	11,000 Vis 9,000	.....	.....	1,800 Poly, 360 A*
Mataripe	[3]10,000	.....	.....	.....	180 Poly
Rio de Janeiro	(4)	.....	.....	.....	.....
Total	157,300	29,300	37,000	.....	

(1) Adding 6,000-bbl. Platformer, 9,000-bbl. Unifiner. (2) Adding 15,500-bbl. crude capacity, plus 11,000-bbl. Hydroformer and 11,000-bbl. Hydrofiner. (3) Adding 42,000-bbl. crude capacity, 10,500-bbl. vacuum unit, 12,000-bbl. FCC unit, 514-bbl. Poly unit, 6,400-bbl. lube plant, and 50-ton-daily asphalt plant. (4) 90,000-bbl.-daily refinery under construction, to include 21,300-bbl. FCC unit, 11,800-bbl. Houdriformer, and 11,800-bbl. cat hydrogenation unit, plus 1,300-bbl. alkylation facilities. *Tons daily.

BRAZIL PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Agua Grande, 1951	250-2,200	102	39,270	29,440,054	38-42
Aratu, 1942	475-750	12	(*)	57,222	44
Candeias, 1941	1,000-1,450	124	13,400	17,636,496	30-31
Dom Joao, 1947	315	225	2,530	4,387,147	38
Itaparica, 1942	550-750	26	305	535,998	25-38
Jacuipe, 1956	750	[1]1	.....	.....	...
Lobato, 1939	400	7	6	86,683	31
Mata de Sao Joao, 1951	400-1,150	34	1,570	2,030,954	38
Paramirim, 1950	140-1,135	2	45	163,563	...
Pojuca, Central, 1953	1,400-1,460	6	(*)	19,126	38
Buracica, 1959*	534-650	2	3	478	...
Cassarongongo, 1959*	1,450	1	11	1,959	...
Jiquia, 1958	1,500	2	(*)	9,729	...
Nova Olinda, 1954*	2,700	1	(*)	1,600	...
Rio da Serra, 1951	140-275	12	60	34,701	28
Rio Sao Francisco, 1959	1,900	1	.....	1,627	...
Socorro, 1958	1,250	1	(*)	.....	...
Taquipe, 1959	1,200	3	12	2,378	...
Total		561	57,212	54,409,715	

*Shut in. (1) Gas.

CHILE—Mainland production in spring

CRUDE production from the Chilean mainland will start in spring when the government company, ENP, completes a 35-mile 8-in. pipeline outlet.

The fields lie on the extreme southern tip of the mainland, across the Straits of Magellan from Tierra del Fuego, where present output has reached more than 18,000 bbl. daily. The new pools will add another 4,000 bbl. to 5,000 bbl. daily.

Capacity of the government's 24,000-bbl.-daily refinery at Concon is being doubled to 48,000 bbl. daily. Mobil Oil and a local marketing company are building a lubricant-blending plant at Vina del Mar.

CHILE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Empresa Nacional del Petroleo, Concon	[1]24,000	4,500 5,000 Vis	.....	4,000 T	.....
Total	24,000	9,500	.....	4,000	

(1) Adding 24,000-bbl. crude capacity plus 10,080-bbl. vacuum unit, 12,000-bbl. FCC unit, 6,000-bbl. Sinclair-Baker reformer, and 1,100-bbl. alkylation unit.

CHILE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Albatros, 1957	6,300	1	....	89	53,109	63
Calafate, 1956	6,000	6	2	556	406,523	46
Catalina, 1956	5,900	3	1	311	116,118	66
Chanarcillo, 1950	7,600	5	3	654	1,159,104	46
Chanarcillo, Sur, 1952	7,500	2	....	131	255,500	46
Chillan, 1953	7,600	13	....	791	2,096,208	41
Cullen, 1954	6,000	34	....	6,912	5,914,874	42
Espora, 1949	7,500	....	....	.....	4,489	46
Flamenco, 1954	6,500	5	1	273	429,791	42
Gaviota, 1957	7,200	2	....	192	170,264	42
Lautaro, 1957	8,300	2	....	127	103,772	40
Manantiales, 1945	7,500	6	7	368	1,445,890	42
Sombrero, 1950	7,500	15	2	2,902	6,449,230	42
Tres Lagos, 1957	5,800	8	....	933	361,692	39
Vertientes, 1956	7,500	3	....	459	336,445	61
Victoria, Este, 1954	7,500	3	1	308	747,438	46
Victoria, Norte, 1950	7,600	2	....	293	710,583	42
Victoria, Sur, 1950	7,500	9	1	1,355	3,543,491	42
Lynch, 1958	6,000	1	....	92	12,892	58
M. Aymond, 1958*	7,200	....	....	.....	.....	
Punta Delgada, 1952	7,600	1	....	34	8,196	39
Punta Delgada, Este, 1958	7,500	2	....	117	7,652	40
Tranquilo, 1958*	1,650	....	....	.....	.....	
Total		123	18	16,897	24,323,261	

*Shut in.

COLOMBIA—Liveliest drilling play

RENEWED INTEREST in Colombia is giving the country its liveliest drilling play in years.

Production has risen slowly to an all-time record peak of more than 155,000 bbl. daily in an individual month, and the government is confident that its own and privately operated production will exceed 200,000 bbl. daily by 1963.

The most recent gains have been largely the result

COLOMBIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Colombian Petroleum Co., Tibu	5,800	.....	.....	.....	.....
Empresa Colombiana de Petroleos: Barrancabermeja	37,500	16,500 Vis	[1]19,280 FCC	.....	4,700 V, 1,205 Alky, 200 L, 1,375 A
La Dorada	4,000	.....	.....	.....	.....
Texas Petroleum Co., Guamo	1,100	.....	.....	.....	.....
International Petroleum (Colombia), Ltd., Cartagena	28,000	.....	[2]25,078	.....	17,500 V, 1,670 Poly
Total	51,200	16,500	44,358	.....	

(1) 15,130-bbl. fresh feed. (2) 13,130-bbl. fresh feed.

COLOMBIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Buturama, 1953	6,000	....	1	11	420,439	38.4
Caipal-Ermitano, 1955	5,600	2	6	596	367,764	15.3
Campo Yuca, 1957	4,800	....	1	15	8,662	35.5
Cantagallo, 1943	4,900	5	6	2,306	7,760,287	20.5
Carbonera, 1939	800	....	2	31	322,930	20.7
Casabe, 1941	2,140-5,660	....	380	21,371	140,969,460	20.8
Cicuco, 1956	7,800	11	....	12,272	5,283,887	43.5
Colorado, 1925	2,800-5,600	5	7	428	1,660,240	30-40
El Dificil, 1943	5,590-5,800	11	....	893	7,607,519	49.2
Galan, 1945	3,000-4,000	14	21	2,665	5,592,437	19-20
Gualanday, 1957	7,700	1	....	40	32,364	38.0
Infantas, 1918	600-3,500	1	319	7,071	181,736,242	24-32
Las Garvas, 1957	8,374-8,460	3	....	474	148,940	32.0
La Cira, 1925	900-4,200	1	740	17,033	312,464,645	24-30
Ortega, 1951	5,600	....	2	1,022	2,063,071	28.7
Palagua, 1954	4,000	8	65	9,787	6,822,104	15.3
Penas Blancas, 1958	5,176-5,780	4	....	970	363,559	29.2
Petrolea (North), 1933	950	4	6	145	32,585,799	44.9
Petrolea (South), 1937*	1,000	....	....	....	42,178	....
Puerto Barco, 1958	6,800	2	....	305	189,031	49.4
Rio de Oro, 1937	1,200-7,370	7	8	1,828	5,472,366	46.6
Sogamoso, 1957	11,000	....	1	142	93,272	27.6
Sardinata, 1950-1958	4,000-8,100	13	5	1,093	3,982,661	27-0-36.0
Tetuan, 1950	2,500	....	1	179	321,651	22.1
Tibu, 1942-1957	500-8,100	39	216	21,287	101,813,134	31.5-46.0
Totumal, 1951	7,200	3	....	110	305,838	26.5
Yariqui, 1954	6,960-8,520	14	1	10,279	10,108,952	20.4
Velasquez, 1946	4,700-6,000	53	52	28,765	39,070,385	24.5
Cristalina, 1959	....	2	....	....	....	....
Floresanto, 1958	....	3	....	2	....	....
San Pedro, 1959	....	1	....	....	....	....
Lebrija, 1955	6,840	7	....	88	....	27
Total		214	1,840	141,208	867,609,817	

*Depleted and abandoned.

of the development of a new Colombian Petroleum field, Cicuco, which has produced more than 18,000 bbl. daily. Colpet's parent companies, Mobil Oil and Texaco, are adding a 69-mile 12-in. loop to a 263-mile 12-in. system to the Caribbean that will handle Cicuco output. The loop will increase the line's capacity by 36,000 bbl. daily.

Several producing wells have been brought in by Cities Service on Las Monas structure in the 2-million-acre El Carare area. An evaluation program is in progress at the find. Partners in the search are Richfield Oil, and the government-owned Ecopetrol.

At least eight companies have wildcatting programs under way. Texaco has three exploratory rigs active. International Petroleum, Shell, Colpet, and Mecom each have two. Sun, Ecopetrol, and Colcito have one. Ambassador Oil Corp., of Fort Worth, is drilling the Intercol well on a farmout.

The government is toying with the idea of revising the oil law. But the proposed changes have been criticized on the grounds that private companies would be barred from three-fourths of the country's prospective oil lands. Ecopetrol will take over management of Intercol's 37,500-bbl. Barranca refinery in 1961. The plant was part of the original De Mars Concession, which reverted to the government in 1951. Since then the plant has been operated by the Jersey Standard affiliate on a 10-year lease.

CUBA—Exploration may be dead

A NEW oil law passed by the Castro Government may have killed exploration in Cuba.

The new regulations limit existing concessions to 20,000 acres, reduce their life to 2 years, and raise royalty rates on crude production. No new concessions will be granted. The law came on top of a dozen years of disappointing exploration work that cost companies more than $30,000,000. There were no major discoveries, and crude production has fallen below 600 bbl. daily.

The specter of refinery nationalization is more serious. The new law set up a Petroleum Reform In-

CUBA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Bacuranao Refining Co., Bacuranao	300	.....	.....	.....	.....
Cia. Petrolera Shell de Cuba, Havana	27,000	.....	.....	5,000 Pf	.....
Esso Standard Oil Co., S. A., Belot	36,500	.....	24,000 FCC	2,600 Pwr	2,400 Hyd., 1,300 Poly, 1,000 A
Refineria Cabaiguan, S. A., Cabaiguan	2,500	500	.....	.....	.....
Santa Maria Oil Refining Co., Havana	600	.....	.....	.....	.....
The Texas Co. (West Indies), Ltd., Santiago de Cuba	20,000	.....	.....	3,300 Pf	4,100 H
Total	86,900	500	24,000	10,900	

CUBA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Bacuranao-Cruz Verde, 1955	1,000-1,300	....	11	76	[1]343,001	28.0
Catalina, 1956	7,000	....	....	(*)	19,631	32.0
Guanabo, 1956	1,400-2,200	....	3	51	75,728	8-11
Jarahueca, 1943	500-3,000	....	6	1	1,248,901	38-40
Jatibonico, 1954	1,100-1,300	....	21	369	1,252,485	15-16
Motembo, 1885	400-1,700	....	[2]150	9	1,810,614	60-62
Santa Maria, 1955	2,200-6,000	....	4	27	87,941	16-28
Total		....	195	533	4,838,301	

*Shut in. (1) Includes production of old Bacuranao field, now depleted. (2) Production by bailing stripper wells.

stitute to oversee refining, transportation, distribution, and the sale and purchase of oil, as well as exploration. The institute has been authorized to operate any refinery that may be seized by the government. One small plant at Gabaiguan, owned by sympathizers of the former government, already has been taken over.

ECUADOR—Impasse has ended

AN IMPASSE between the government of Ecuador and the country's largest operator has ended with a promise of product price increases.

The government will raise prices when work is completed on a 7,700-bbl. refinery being built by Anglo-Ecuadorian Oilfields. The company had suspended work on the plant for more than a year because of certain loss on its operation. This was because the new facilities would replace an old 5,000-bbl. plant, and the increased capacity would require more crude. This crude has been exported, and has made up the loss taken until now on local marketing.

ECUADOR REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Anglo-Equadorian Oilfields, Ltd, La Libertad	[1]5,700	.....	.....	.....	50 V, 25 L
Santiago Petroleum Co., Cautivo	1,700	.....	.....	.....	.....
Total	7,400	.....	.....	.....	

(1) Adding 7,700-bbl. crude capacity, plus 6,000-bbl. Dubbs thermal cracker.

ECUADOR PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Anglo, 1912	500-5,000	13	1,332	6,301	60,817,108	37-38
Carolina, 1930	200-5,000	17	54	440	2,614,512	27-28
Concepcion, 1930	500-4,000	....	28	113	1,498,564	....
Petropolis, 1939	400-2,800	....	21	116	1,431,951	29-30
Achallan, 1919	700-1,200	....	33	11	754,170	35
Ahuiguimi, 1922	300-1,200	....	8	7	161,742	34
Carmela, 1953	1,700-3,800	....	7	11	47,710	34
Cautivo, 1918	400-1,500	1	16	23	163,165	35
San Raimundo, 1928	300-1,500	....	15	31	300,294	35
Tigre, "deep," 1938	4,200	....	51	585	7,420,354	37
Tigre, "shallow," 1933	900-1,800	....	33	200	580,000	37
Total		31	1,598	7,838	75,789,570	

MEXICO—Pemex bolsters finances

PEMEX took action to strengthen its financial underpinnings last year by negotiating $70,000,000 in loans with U. S. and other foreign banks.

The Mexican Government company is using the funds for projects that will expand the country's pipeline network and help establish a state-owned petrochemical industry. The biggest of these projects has already been started. This is a 500-mile, 24-in. natural-gas line from Ciudad Pemex to Mexico City, being built with a $40,000,000 loan from banks located in the U. S.

The Mexican Congress has placed the manufacture of basic petrochemicals under the direction of Pemex. This includes the production of butadiene, ammonia, methanol, ethylene, toluol, and several other products.

The government company, now under the direction of Pascual Gutierrez Roldan, continues to expand drilling. The goal for this year has been 477 wells, with emphasis on wildcats. Crude output for the year has averaged more than 260,000 bbl. daily.

Pauley Pan American Petroleum Co. is drilling development wells on an offshore discovery made earlier this year off the State of Tabasco. Pauley, drilling under a contract, has brought in a second barge after two wells were completed as producers. The discovery, 1 Santa Anna, was dually completed at 1,684 bbl. daily. The first stepout was brought in at 2,340 bbl. daily of 38°-gravity oil.

MEXICO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Pemex:					
18 de Marzo—Atzcapotzalco	100,000	25,000 Vis	25,000 FCC		[1]55,000 V, 39,000 PD, 1,200 Alky, 500 Is, 1,100 Poly
Ing. Antonio M. Amor—Salamanca	[2]40,000	5,000			15,000 V, 9,000 PD, 2,600 L, 800 A
Madero—Madero	[3]75,000	8,500 Vis			18,000 V, 11,500 PD, 3,200 A
Arbol Grande—Arbol Grande	26,000				2,000 A
Mata Redonda—Villa Cuauhtemoc	14,000	9,500 Vis			
Reynosa—Reynosa	10,000	2,000			
Poza Rica—Poza Rica de Hidalgo	[4]7,000				
Minatitlan—Minatitlan	[5]85,000		12,000 TCC		24,000 V, 1,400 Poly, 800 L
Total	357,000	50,000	37,000		

(1) Adding 3,400-bbl. alkylation unit. (2) Planned additions include 40,000-bbl. crude unit, 30,000-bbl. vacuum unit, 20,000-bbl. FCC unit. (3) 100,000-bbl. crude unit nearing completion, 55,000-bbl. vacuum unit and 30,000-bbl. FCC unit due on stream by mid-1960. (4) Planned additions include 15,000-bbl. crude unit and Perco desulfurizer. Present plant has 90,000-bbl.-daily crude stabilizer. (5) Includes 28,000-bbl.-daily crude stabilizer. Planned additions include 50,000-bbl.-daily crude unit, 20,000-bbl. visbreaker, 30,000-bbl. Platformer, and hydrogenation unit.

MEXICO PRODUCTION

NORTHERN ZONE
Northeastern District

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Berrendo, 1955	4,117				2,428	48
Francisco Cano, 1949	5,420	5		425	2,085,992	48
Lomitas, 1954	4,839	1		3	6,007	42
18 de Marzo, 1956	7,120				4,598	36
Mision, 1955	7,717	3		211	60,978	46
Monterrey, 1950	5,781	1		126	667,438	47
Reynosa, 1948	4,613	2		290	2,889,686	63
Rio Bravo, 1953	4,377	1		2	5,278	47
Trevino, 1950	5,797	33		1,428	4,946,074	37
Zacate, 1948	2,021				182	
Total Northeastern District		46		2,485	10,668,661	

MEXICO PRODUCTION (Continued)

Northern District

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Constituciones, 1956	6,247	38	3	6,042	2,927,972	19
Ebano-Panuco-Cacalilao, 1901	1,150	458	73	15,666	877,012,804	12
Tamaulipas, 1956	4,190	33	5	5,444	4,064,685	19
Total Northern District		529	81	27,152	884,005,461	

Southern District

Cabo Rojo, 1953	3,936	2	...	38	85,204	22
Moralillo, 1948	4,592	18	2	730	8,915,725	12
Naranjo-Cerro Azul (Golden Lane), 1908	2,200	234	....	8,524	1,140,309,597	20
Solis, 1952	2,132	25	....	1,197	5,156,765	20
Others	....	3	....	581	1,523,842	..
Total Southern District		282	2	11,070	1,155,991,133	

Poza Rica District

Allende, 1955	7,470	....	....	.....	19,342	27
Avila Camacho, 1952	5,189	1	....	22	154,889	35
Chote, 1955	7,704	....	....	.....	42,811	24
El Hallazgo, 1957	10,155	29	....	11,570	4,109,960	25
Gran Morelos, 1957	9,880	2	....	1,298	1,799,619	27
Guerrero, 1955	6,578	1	....	281	3,825,302	26
Gutierrez Zamora, 1956	6,414	2	....	98	368,178	17
Hidalgo, 1954	7,720	6	....	1,152	5,191,795	31
Independencia, 1957	9,293	....	....	.....	5,585	31
Jiliapa, 1958	7,349	12	....	2,185	792,307	34
Macarena, 1955	10,332	1	....	37	41,813	22
Nuevo Progreso, 1955	7,177	7	5	1,194	2,654,886	31
Poza Rica, 1930	6,900	94	193	84,528	746,691,683	35
San Andres, 1956	10,286	71	....	37,847	30,186,484	29
Tajin, 1954	7,950	1	....	14	141,933	34
Tecolutla, 1956	7,556	1	....	105	265,801	31
Others	....	....	....	.....	3,031,084	..
Total Poza Rica District		228	198	140,331	799,323,452	

NEW GOLDEN LANE

Acuatempa, 1955	4,019	17	....	2,938	8,160,872	21
Boca de Lima, 1956	5,702	....	....	.....	198,266	16
Caristay, 1957	4,885	....	....	.....	.....	23
Chichimantla, 1955	3,885	2	....	539	416,881	21
Copal, 1957	4,595	....	....	.....	25	15
E. Ordonez, 1952	4,723	14	....	3,933	35,462,635	21
Horcon, 1952	2,804	4	....	624	1,284,187	20
Las Canas, 1956	2,795	....	....	.....	1,717	23
Mesa Cerrada, 1956	3,934	9	....	1,978	994,227	22
Mozutla, 1953	4,002	4	....	628	6,439,777	18
Nueva Colonia, 1956	2,936	1	....	86	95,293	17
Ocotepec, 1953	3,395	5	....	1,633	7,360,528	20
Sta. Agueda, 1953	4,495	42	....	14,188	48,472,201	16
Tihuatlan, 1957	3,063	2	....	130	102,866	22
Xacotla, 1953	3,294	3	....	133	115,163	15
Total New Golden Lane		103	....	26,810	109,104,638	

CENTRAL ZONE
Vera Cruz District

Angostura, 1953	3,600	8	6	4,752	15,313,850	15
Casa Blanca, 1953	2,220	1	....	3	5,773	40
Tres Higueras, 1955	1,782	1	....	57	117,446	34
Total Vera Cruz District		10	6	4,812	15,437,069	

SOUTHERN ZONE
Isthmus of Tehuantepec

Acalapa, 1953	2,051	1	2	365	2,153,560	30
Agata, 1956	3,199	24	3	3,975	1,797,832	34
Arroyo Blanco, 1952	2,180	1	20	334	1,866,519	30
Concepcion, 1909	2,130	....	....	.....	57,098	41
Cuichapa, 1934	2,100	2	10	922	6,041,061	30
El Burro, 1930	2,460	6	43	1,422	22,642,386	26
El Plan, 1931	1,970	40	117	10,727	107,987,366	30
Filisola, 1921	1,585	....	36	713	24,247,062	22
Ixhuatlan, 1911	1,017	....	73	570	1,505,289	21
Los Soldados, 1953	4,480	5	....	519	128,614	32
Moloacan, 1948	1,370	....	14	196	990,251	26
Nuevo Teapa, 1928	429	....	18	182	758,969	36
Rabon Grande, 1951	2,296	1	17	993	4,995,972	32
Tacuilolapa, 1955	2,920	2	4	348	533,625	36
Tonala, 1928	1,640	....	68	1,834	54,626,321	28
Others	....	....	....	.....	357,014	..
Total Tehuantepec		82	425	23,100	230,688,939	

MEXICO PRODUCTION (Continued)

Tobasco

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Fortuna Nacional, 1949	5,330	3	....	45	287,831	53
Jose Colomo, 1951	5,230	3	11	646	3,733,989	46
La Venta, 1954	4,698	82	31	11,844	11,494,362	41
Magallanes, 1957	3,829	25	....	3,241	898,192	27
Mecoacan, 1958	6,201	5	....	169	51,213	24
Morales, 1954	3,104	....	....	....	799	51
Ogarrio, 1957	5,722	64	....	14,729	5,085,811	38
Vernet, 1928	3,465	4	1	310	702,126	48
Others	....	....	....	12	16,649,403	....
Total Tabasco District		186	43	30,996	38,903,726	
Total Mexico		1,466	755	266,856	3,244,123,079	

PERU—A shot in the arm

THE PERUVIAN oil industry got a shot in the arm this year when product prices were raised at considerable political risk by Pedro G. Beltran, the new premier.

Low prices had discouraged investments by established companies, and the largest operator, International Petroleum, had stopped drilling earlier in the year in the middle of a $40,000,000 expansion program.

The decree by Beltran raised prices, and at the same time specified that operators must reinvest not less than half of the annual depreciation allowance, and half of the net profit after taxes. The law enabled International to resume its investment program. The company handles 90% of the country's 48,000-bbl.-daily crude production as operator for itself and for properties held jointly with Cia. Petrolera Lobitos.

Several smaller operators also are active Peruvian Pacific, a Cities Service-Richfield subsidiary, is studying an offshore structure to see whether a permanent platform is feasible. Three of five shallow holes from 900 to 3,000 ft. tested oil at 200, 300, and 400 bbl. daily. The wells have been plugged. The program will be resumed next year when good weather returns.

Cia. Petrolera Amotape, an independent American company, drilled four wells this year, at least one of which has been completed as a 200-bbl.-daily producer. The company operates properties in the coastal zone in the vicinity of Intercol and other companies.

Maquia field, discovered 2 years ago in the jungles of eastern Peru, has gone on commercial production at the rate of about 750 bbl. daily. A joint German-Peruvian company moves the crude down the Ucayali River to Manaus refinery on the Rio Negro in Brazil. Both rivers are part of the Amazon system.

PERU REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Cia. de Petroleo Ganzo Azul, Ltd., Pucallpa	1,000	.....	.....	.....	.....
Empresa Petrolera Fiscal, Iquitos	1,200	.....	.....	.....	.....
International Pet. Co., Ltd., Talara	47,000	20,800 Vis	.....	.....	250 L, 400 A, 2,600 V
Total	49,200	20,800	.....	.....	

PERU PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Agua Caliente, 1937	900-1,400	3	14	2,201	4,252,129	44.2
La Brea-Parinas, 1888	3,000	175	1,622	22,782	411,388,731	36.0
Lima Concessions, 1901	3,000	90	893	20,404	123,580,890	38.4
Maquia, 1957	2,137-2,162	(1)	....	.....	.....	38.0
Mirador, 1955	5,000	....	....	.....	.....	38.0
Patria Concession, 1943	2,000	....	....	.....	.....	42.0
Sector Peru, 1953	3,500	[2]26	[2]150	[2]2,925	.....	31.0
Tablazo, 1955	6,000	....	....	.....	.....	33.0
Zorritos, 1863	2,000	....	....	.....	.....	36.8
Total		294	2,679	48,212	550,214,000	

*Includes gas lift. (1) 10-well field on production in October, producing about 750 bbl. daily. (2) Estimated.

PARAGUAY-URUGUAY—Drilling comes to a halt

PURE OIL CO. and four partners suspended exploration operations after drilling four dry holes in northern Paraguay. There are no immediate plans for further tests. But the group retained an interest in 3 million of the original 14-million-acre concession area here.

There has been no drilling in Uruguay. A government-owned refinery near Montevideo is being doubled from 28,000-bbl. to 56,000-bbl. capacity.

URUGUAY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Administracion Nacional de Combustibles, Alcohol y Portland Refineria ANCAP-Montevideo, Teja	[1]28,000	2,000	.....	.....	750 V, 350 A
Total	28,000	2,000	.....	.....	

(1) Expansion program doubling output. New units include 28,000-bbl. crude unit, 10,000-bbl. vacuum unit, 5,000-bbl. Orthoflow "B" cat cracker, 3,000-bbl. Sinclair-Baker-Kellogg reformer, and 3,000-bbl. asphalt unit.

TRINIDAD—Continues to expand

TRINIDAD'S oil industry continues to expand in the face of competition from much larger oil exporting countries.

Crude production has risen slowly, but steadily, to more than 114,000 bbl. daily. The gains have come from intense development onshore, and from new wells drilled in a young offshore field at Soldado Rock in the Gulf of Paria. The operator, Trinidad Northern Areas, is owned jointly by Texaco, Shell, and British Petroleum.

Texaco is expanding its Pointe-a-Pierre refinery from 135,000-bbl. to 235,000-bbl. capacity. The expansion program includes a 100,000-bbl. topping unit, a 15,000-bbl. catalytic reformer, and a 20,000-bbl. hydrotreater. The new facilities are scheduled to open late in 1960.

The government is contemplating a shift in its oil laws that would put the country on a 50-50 profit-split basis. This might put the industry on a better footing to compete for European markets. In addition to 5,000-bbl.-daily local demand, and 25,000 bbl. daily in bunker sales, Trinidad has available more than 100,000 bbl. daily of crude and products for foreign markets. This includes reexport of processed oil.

TRINIDAD REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Brighton Terminal, Ltd., Brighton	5,000	.....	.....	.....	.....
Shell Trinidad, Ltd., Point Fortin	[1]47,000	.....	.....	.....	.....
Texaco Trinidad, Inc., Pointe-a-Pierre	[2]135,000	25,000 Vis	28,000 FCC	8,500 Pf	6,000 V, 8,500 Un, 2,200 Alky, 1,300 Poly
Total	182,000	25,000	28,000	8,500	

(1) Adding net 17,000-bbl. crude capacity. (2) Adding 100,000-bbl. crude capacity plus 15,000-bbl. Platformer, 15,000-bbl. Unifiner, and 20,000-bbl. gas-oil hydrotreater.

TRINIDAD PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Balata-Bovallius, 1952	7,200-9,426	....	....	.....	.....	29-35
Brighton-Vessigny and Adjacent Marine Area, 1908	700-7,500	....	....	.....	.....	16-38
Cats Hill, 1953	1,400-9,095	....	....	.....	.....	29-46
Forest Reserve-Apex-San Franique-Pt. Fortin East, 1913	1,000-16,115	....	....	.....	.....	15-33
Guayaquayare, 1902	500-7,919	....	....	.....	.....	15-49
Inniss/Trinity, 1956	5,127	....	....	.....	.....	33
Kern-Parrylands-Cruse, 1913	2,000-10,626	....	....	.....	.....	13-30
Moruga, 1953	9,693	....	....	.....	.....	11-40
Oropouche, 1954	2,000-9,077	....	....	.....	.....	35
Palo Seco-Los Bajos, 1926	460-12,718	....	....	.....	.....	16-33
Penal-Barrackpore, 1918	1,300-11,067	....	....	.....	.....	11-35
Point Fortin-Point Ligoure and Adjacent Marine Area, 1908	1,000-10,800	....	....	.....	.....	15-45
Quarry-Coora-Quinam-Morne Diablo, 1936	280-14,018	....	....	.....	.....	16-30
Colenso, 1958	7,091	....	....	.....	.....	....
Total Trinidad		941	[1]2,228	109,622	[2]646,848,000	

(1) Includes gas/air lift, plunger, etc. (2) Estimated.

VENEZUELA—A punch on the chin

THE OIL INDUSTRY in Venezuela has taken a one-two punch on the chin, and nobody knows for sure just what will result from the damage.

The first blow came with the closing days of last year when the new Venezuelan Government revised its income-tax structure to give the country in effect 60% of the net profit from industry operations. This broke the 50-50 formula which was born in Venezuela and had been in effect there for 15 years.

The move especially hurt because the increase was made retroactive on 1958 operations. Companies unexpectedly had to kick in more than $176,000,000 in taxes for which no provisions had been made.

The second shock came later when the new minister of mines and hydrocarbons, Dr. Juan Pablo Perez Alfonzo, made it clear that the government intends to limit crude production to a small annual rate of increase. The decision stems from a desire to conserve oil for future use. It is based on the assumption that Venezuelan oil will some day be more valuable, and that a predetermined amount of oil will always be able to move profitably in world markets.

The government plans to hold output to about 2,700,000 bbl. daily in 1960. This is the approximate average for this year.

Increased taxes and the probability that return on investment will further be held down by curtailed production has made the outlook dreary for most operators. Shut-in capacity has grown to 1,000,000 bbl. daily, and there are 9,300 shut-in wells.

Despite a sharp reduction in investment programs of many companies, there still is a considerable amount of construction. Cia. Shell de Venezuela is spending $100,000,000 on an integration program in the Lake Maracaibo area that will turn its operations there into one big, virtually automatic crude-gathering and terminal system. Known as North Terminal System, the facilities will handle most of Shell's 700,000 bbl. to 900,000-bbl. daily output in the region.

Among the other projects in the Maracaibo area, the Sun group has installed a 100,000-bbl.-daily flow station that will move production from Block 1 to storage at Punta de Palmas terminal.

Drilling has fallen off sharply. There have been about 51 active rigs, 15 wildcats and 36 fields in the entire country. This compares with a record 123 rotaries that were making hole 2 years ago.

About one-fifth of the well completions are being made by newcomers to Venezuela who invested heavily in new concessions 3 years ago. Total payments in bonuses and initial taxes, made by both established operators and newcomers, was $667,000,000. Most of the payments were for acreage in Lake Maracaibo.

Established operators with hundreds of thousands of barrels of shut-in capacity have been in no hurry to drill up new concessions. But in at least one case, old-line companies have moved in rigs to offset an active newcomer on neighboring acreage.

Phillips Petroleum groups drilling on Blocks 17 and 10, lying on either side of Shell's Blocks 7 and 8,

VENEZUELA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Shell de Venezuela, Ltd.:					
Cardon	[1]283,000		35,000 FCC	8,700 T	89,000 V, 2,500 Alky, 2,000 Poly, 3,000 L
San Lorenzo	45,000				
Colon Development Co., Ltd.:					
Calvario	300				
Casigua	1,000				
La Riviera	300				
Creole Petroleum Corp.:					
Amuay	345,500			11,100 Fhy	89,900 V, 17,000 Hyd, 778 L
Caripito	68,000	36,000 Vis			
Petroquimica, Moron	3,000		350 Cat		
Phillips Petroleum Co., San Roque	3,500				
Richmond Exploration Co., Bajo Grande	[2]30,000				7,000 A
Sinclair Oil & Refining Co., Puerto La Cruz	35,000	12,000 Vis			
Mobil Oil Co. de Venezuela:					
El Palito	[3]				
Barinas	200				
Texas Petroleum Co., Tucupita	10,000				
Venezuela Gulf Refining Co., Puerto La Cruz	[4]61,200	14,500 Vis 12,000 Plf	8,650 FCC		
Total	886,000	74,500	44,000	19,800	

(1) Adding 45,000-bbl. visbreaker. (2) Adding 5,000-bbl.-daily crude capacity. (3) 50,000-bbl. refinery near completion to include 6,000-bbl. cat reformer. (4) Adding 65,000-bbl. crude capacity.

have prompted Shell to move in rigs to the extreme edges of its tracts to offset Phillips' wells. One Phillips rig, in the northwest corner of Block 10, has two offsets. The Shell well is to the southeast, and a Creole rig is across the line to the north on Block 5.

On the Venezuelan side of the Gulf of Paria, two rigs are making hole for Paria Operations, owned by five companies which paid $100,000,000 for its offshore concessions. Twenty-five deviated wells are planned from a permanent platform.

Mobil Oil has increased the design capacity of its refinery under construction at El Palito from 40,000 bbl. to 50,000 bbl. daily. The site is at the terminal of Barinas pipeline. The plant is expected to be completed in March 1960.

The government has taken firm action with its Petrochemical Institute, which had been a major scandal of the former administration. There are now hopes of completing the facilities of the government-owned petrochemical complex in 2 years, and of making the organization profitable within 4 years. About $180,000,000 has been invested in Petroquimica facilities. To show for it is a completed 1,800-bbl. refinery, a partially completed natural-gas-pipeline system, fertilizer plant, and chlorine and soda ash plant.

Royal Dutch-Shell is combining the smaller of its two operating companies in Venezuela with the giant CSV. Colon Development produces about 20,000 bbl. daily. Pending approval by minority stockholders, it will be merged with CSV on the last day of 1959.

VENEZUELA PRODUCTION

EASTERN VENEZUELA
State of Anzoategui

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping*	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Apamate, 1951	6,670	1	....	34	448,702	43.1
Araibel, 1954	8,970-10,516	8	1	3,892	9,183,064	34.2-35.1
Boca, 1951	9,500	17	....	8,855	33,002,599	32.0-34.8
Bucoral, 1958	....	2	....	657	149,911	40.5
Bruzual, 1954	2,900	....	....	....	44,255	47.7
Cachama, 1952	7,724	1	....	125	690,842	31.0
Caico Seco, 1946	6,500-7,300	11	9	3,461	16,535,318	37.1-42.1
Cantaura, 1951	11,962	2	....	174	51,174	43.5
Capacho, 1945	4,115	....	....	....	12,492	23.3
Cascaroncito, 1953	8,968	....	....	....	17,523	38.5
Cerro Pelado, 1951	4,400	....	....	....	121,607	38.1
Chaparrito, 1957	....	....	....	....	13,209	32.9
Chimire, 1948	7,000-7,200	88	21	43,701	160,905,922	36.1-36.5
Dacion, 1951	6,700	32	51	22,398	75,374,265	21.6
Elias, 1957	5,100-5,300	4	3	871	789,502	36.1
El Roble, 1939	8,044-11,560	13	6	2,524	30,629,924	44.3-47.5
Esquine, 1951	4,360	3	....	1,284	1,855,120	30.1
El Toco, 1948	9,000	7	5	3,214	13,933,913	40.5
Flecha, 1953	5,736	1	4	1,771	1,507,627	34.9
Fria, 1948	6,500-7,300	14	2	2,179	8,339,587	37.5
Galan, 1957	....	....	....	....	5,717	31.3
Guara, 1942	5,000-10,000	61	141	28,929	304,112,327	26.0-33.4
Guara, 500, 1950	5,700	3	16	3,973	4,981,673	20.4
Guario, 1940	5,000-10,000	24	1	4,228	34,339,201	44.8
Guere, 1951	7,800	4	12	2,249	19,483,505	37.5
Guico, 1944	4,500-7,000	16	29	7,219	52,393,336	29.1-32.0
Inca, 1948	7,100	2	....	844	998,927	39.0
Isla, 1954	5,470	1	....	204	607,746	43.6
Juanita, 1956	4,000	3	....	567	402,547	34.5
Junta, 1954	6,720	12	9	4,363	6,304,902	23.9
Kilo, 1955	9,600	....	....	....	150,609	31.8
La Ceibita, 1953	9,871-9,878	4	....	5,272	6,256,395	38.7
La Vieja, 1951	2,750	....	3	371	2,488,723	24.8
Las Adjuntas, 1954	6,900-7,200	5	....	822	1,892,765	26.3-28.2
La Freitera, 1957	14,554	....	....	....	57,784	37.4
Leona, 1938	2,268-12,085	24	20	16,546	49,782,824	24.5-29.0
Lobo, 1952	6,400	....	7	....	2,310,684	24.5
Los Mangos, 1950	7,743	....	....	....	353,009	42.3
Luna, 1957	5,720	....	5	273	208,842	12.4
Mapiri, Este, 1949	9,500	14	7	6,582	22,388,229	32.0-33.4
Mata, 1951	11,520	93	16	53,465	62,097,271	30.4-35.2
Merey, 1937	5,700	5	119	19,280	15,138,216	9.7-15.0
Nipa, 1945	6,000-8,500	137	82	64,090	211,019,321	31.7-32.9
Oficina, 1937	5,900	101	280	62,642	355,893,250	21.2-26.2
Oscurote, 1953	9,513	32	9	21,093	33,891,235	31.2
Pelayo, 1947	6,650	2	1	193	526,507	23.9
Pradera, 1951	6,430	7	4	2,079	2,876,866	28.7
Quiamare, 1942	5,900-6,650	10	....	1,619	8,612,252	42.2
Rincon Largo, 1941	6,500-8,500	2	....	151	7,034,097	49.7
Rosa, 1958	11,412	2	....	982	374,639	37.5
San Joaquin, 1939	6,560	41	....	6,103	59,282,076	46.7
San Roque, 1949	8,500	20	4	1,163	11,147,205	51.7
Santa Ana, 1939	8,500	33	4	15,816	42,611,105	37.9
Santa Rosa, 1941	8,500	85	....	51,287	80,072,544	44.6
Soto, 1949	9,500	65	32	24,697	82,030,848	35.3
Tacata, 1946	2,200	1	....	107	402,994	37.2

EASTERN VENEZUELA (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Tapuco, 1952	10,000-10,170	5	13	3,691	13,407,526	32.4
Unare-Zuron, 1954	2,900	....	....	....	67,408	41.4
Yopales, 1937	4,600	16	33	8,663	20,646,816	22.8
Zapatos, 1955	....	....	....	7,860	1,422,667	35.2
Zarza, 1957	....	....	....	4	805	54.7
Zeta, 1954	10,700	89	27	26,084	59,790,273	31.8
Zorros, 1953	....	....	....	4,516	810,403	27.8
Zulus, 1957	....	....	....	1,588	287,513	35.9
Zumor Norte, 1955	....	....	....	1,144	206,991	30.0
Zumos, 1954	....	....	....	4,708	850,947	28.7
Total Anzoategui		1,119	976	560,607	1,225,800,711	
Federal Territory of Amacuro						
Pedernales, 1933	1,571	15	....	8,015	47,204,899	21.1
Posa, 1958	1,250	....	....	....	23,656	18.7
Tucupita, 1945	5,606	42	....	5,641	32,233,193	16.6
Total Amacuro		57	....	13,656	79,461,748	
State of Guarico						
Aragua, 1950	7,519-8,822	9	3	990	5,663,732	54.8
Belen, 1954	4,648	1	....	6	358,833	50.0
Bella Vista, 1952	2,962-4,637	12	35	2,191	6,805,689	23.6
Budare, 1958	....	1	....	22	3,919	31.7
Dakoa, 1951	3,500-5,700	2	....	2	345,889	14.4
Grico, 1946	....	....	....	....	....	....
Ipire, 1958	3,000-5,000	....	....	41	8,540,617	21.3-38.4
Las Mercedes, 1942	4,160-4,500	86	81	19,640	87,620,908	31.8
Punzon, 1946	4,400	1	1	385	692,482	32.6
Rositas, 1958	....	....	....	....	....	....
Ruiz, 1949	4,450	8	32	3,590	23,156,006	31.3
Saban, 1947	2,600	4	35	2,400	13,305,757	36.9
Taman, 1949	5,200	1	12	1,027	10,302,208	38.5
Tucupido, 1947	2,800-5,600	4	14	1,525	13,807,155	38.5
Valle, 1955	2,200-5,500	8	2	254	63,955	38.8
Total Guarico		137	215	32,073	170,667,150	
State of Monagas						
Aguasay, 1955	8,100-13,400	26	1	14,676	9,948,400	32.9-39.4
Cachipa, 1957	....	....	....	....	27,757	....
Jobo, 1938	3,600	....	....	....	41,313	13.7-14.4
Jusepin, 1938	3,000-5,300	65	59	8,690	173,008,667	32.9
Manresa, 1954	2,524-2,615	1	2	547	889,680	16.7
Mata Grande, 1946	4,700	5	22	1,152	7,098,637	25.1
Mulata, 1941	3,500-6,600	22	74	4,366	86,885,341	37.4
Muri, 1942	4,500	2	15	466	15,202,560	26.2
Oritupano, 1954	7,675	24	20	12,241	9,685,601	12.0-21.3
Orocual, 1933	2,954	10	3	5,384	5,072,466	11.8-21.2
Pilon, 1937	3,355-3,600	11	9	3,984	1,955,014	14.1-15.2
Quiriquire, 1928	7,000-7,200	3	504	52,262	550,898,259	16.2
Santa Barbara, 1941	5,000-6,500	85	105	15,649	116,650,392	29.5-35.2
El Salto, 1958	5,720	....	....	....	4,145	11.2
Isleno, 1953	3,288-3,304	....	....	....	1,308	13.0
Mosu, 1958	....	....	....	....	1,730	12.5
Pirital, 1958	450-1,100	....	7	1,476	518,569	18.5
Tacat, 1953	1,830-3,668	....	29	7,125	6,698,769	17.8
Temblador, 1936	3,500-4,500	41	17	6,418	60,570,684	21-22
Travieso, 1944	4,000	....	8	116	1,475,549	25.7
Uracoa	4,120	....	....	....	27,348	15.0
Total Monagas		295	875	134,552	1,046,662,189	
Total Eastern Venezuela		1,608	2,066	740,888	2,522,591,798	
Total Venezuela		[1]2,703	[2]6,681	2,819,320	[3]9,191,095,255	

*Includes artificial and gas lift. (1) Another 2,253 wells shut in. (2) Another 4,672 wells shut in. (3) Includes past production of depleted fields.

WESTERN VENEZUELA

State of Barinas

Estero, 1957	10,700	....	1	92	293,199	28.2
Maporal, 1957	10,944	....	1	161	61,313	28.2
Palmita, 1957	10,792	1	....	3	188,883	26.0

WESTERN VENEZUELA PRODUCTION (Continued)

Name of field—Discovery date—	(ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Sinco, 1953	8,500-9,100	26	....	29,877	20,849,338	25.9
San Sylvestre, 1945	8,850	....	2	2,724	5,984,210	28.2
Silvan, 1949	10,862	4	....	4,006	2,971,868	28.2
Total Barinas		31	4	36,863	30,348,811	
State of Trujillo						
Motatan, 1938	8,850	....	....	.....	3,093,198	22.4
Total Trujillo		....	....	.....	3,093,198	
State of Falcon						
Cumarebo, 1913	1,968	6	13	1,980	54,219,755	47.4
Hombre Pintado, 1927	1,000	....	41	632	6,225,644	21.6
Mamon, 1926	3,350	....	....	.....	552,496	32.4
Mene Mauroa, 1921	600-1,850	....	54	748	29,188,146	38.7
Tiguaje, 1953	3,328-3,348	13	10	1,903	2,824,070	26.9
Total Falcon		19	118	5,263	93,010,111	
State of Zulia						
Alturitas, 1950	10,950	....	....	.....	27,304	18.9
Bachaquero, 1930	3,444-11,500	285	981	614,460	1,178,443,663	14.0-37.6
Barua, 1958	10,500	1	....	1,093	475,226	18.1
Boscan, 1946	6,500-7,500	....	182	63,525	152,677,360	10.3
Cabimas, 1917	2,200	73	481	51,517	972,869,656	19.6-25.3
Centro Lago, 1958	....	....	....	103	43,412	30.0
Cueta, 1956	9,600-11,000	11	....	22,877	8,409,293	32.1
Concesiones Lacustres, 1947	....	....	....	.....	.....	....
Curazaito, 1930	....	....	....	.....	10,517	19.0
El Cubo, 1916	984	....	....	19,939	179,021,325	35.5
Ensenada, 1948	8,550	1	....	51	619,885	50.2
La Concepcion, 1935	3,148-8,000	13	80	14,801	69,181,026	36.6
Lagunillas, 1926	3,000	452	1,278	827,025	3,740,378,049	15.1-28.3
Lama (Lagunillas), 1957	8,600	2	....	19,035	13,308,563	33.5
La Paz, 1925	4,264-8,000	17	71	92,878	568,446,015	32.9
Macoa, 1946	6,000-10,200	....	2	....	14,555	11.0
Mara, 1945	5,248	16	33	38,954	288,816,118	29.3-30.1
Mene Grande, 1914	4,132	3	466	31,209	484,286,629	18.1
Mene Grande Lago, 1957	3,050	21	....	31,942	8,965,588	27.0-35.0
San Jose, 1948	10,000-15,500	1	....	2	69,521	29.0
Sibucara, 1948	13,451	5	....	4,351	29,811,614	37.0
Tia Juana, 1928	3,000	135	919	204,258	1,343,634,711	14.0-25.7
Urdaneta, 1957	7,600-8,000	9	....	31,466	8,601,981	10.9-26.9
Total Zulia		1,045	4,493	2,069,486	6,546,548,782	
Total Western Venezuela		1,095	4,615	2,078,432	6,663,000,902	

Other Caribbean and Central America

Bahamas. One of the world's deepest offshore wells has been abandoned in the Bahamas at 18,806 ft. California Standard and Gulf Oil gave up the wildcat after drilling for almost a year at a remote location at Cay Sal. They had budgeted $3,000,000 for the test.

British Honduras. A new joint exploration company formed by British Petroleum and Sinclair Oil will make its first exploration effort in British Honduras. The new joint company, formed early this year, has acquired nine licenses in the northwest part of the crown colony covering 1,000 sq. miles. A similar amount of acreage was applied for by California Standard.

A Gulf-Shell partnership in the northern half of the colony has been carrying on geological work after releasing two rigs. Gulf originally held the entire country under concession. It gave up the southern portion, and took in Shell as a partner in the northern half.

Guatemala. A "very encouraging show" of oil has been found in a Guatemalan wildcat drilled by Ohio Oil Co. on a 109,539-acre concession held jointly with four other companies. The show was found below 10,000 ft. in a well near Chinaja, in the northern part of the country. The show is the best since drilling began last year. Other wildcatting programs have been started by Shell, and by Atlantic Refining, which is operator for a four-company group.

Jamaica. Esso Standard has reached an agreement

NETHERLANDS WEST INDIES REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Lago Oil & Transport Co., Ltd., Aruba	470,000	313,000 Vis.	45,000 FCC	.....	19,200 V, 6,700 Alky
N. V. Curacaosche Pet. Industrie Mij., Curacao	210,000	85,000	35,000 FCC	20,000 T	.....
Total	680,000	398,000	80,000	20,000	

PANAMA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Panama Ref. & Petrochemical Co., Inc., Portobello Harbor	(1)	.....	.....	.....	.....
D. K. Ludwig, Las Minas Bay	(2)	.....	.....	.....	.....
Total	.....	.....	.....	.....	

(1) Planned 55,000-bbl. refinery. (2) Planned 70,000-bbl. refinery.

PUERTO RICO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Caribbean Refining Co., Bayamon	15,200	.....	8,800 FCC	.....	9,800 V
Commonwealth Oil Refg. Co., Inc., Guayanilla	[1]68,500	20,000 Vis	53,600 TCC	7,460 HF	44,000 V, 7,500 Un, 1,400 Alky, 2,370 Poly
Total	83,700	20,000	62,400	7,460	

with the Jamaican Government for a 26,000-bbl. refinery. The plant will be the first for Esso in the young Federation of Caribbean Islands.

A provisional 4-million-acre concession has been awarded to a subsidiary of Time Petroleum, Wichita. The rights cover both the island and its territorial waters. Time must drill five 1,000-ft. and one 15,000-ft. tests.

Panama. Ultramar, Ltd., a British holding company, has taken over a proposed $50,000,000 refinery project in Panama. The rights were obtained from Panama Refining & Petrochemical Co., of Los Angeles, which 2 years ago awarded a construction contract for a 55,000-bbl. plant.

No new wildcatting ventures have been reported since Champlin Oil & Refining abandoned its second offshore well at the end of last year.

Puerto Rico. The first wildcat ever drilled in Puerto Rico has been scheduled for a concession held by David L. Gordon, Houston independent. An agreement has been reached with Kewanee Oil Co. for a rig from Cuba. The location is near the coast.

EUROPE

AUSTRIA—Negotiations for Nazi confiscations

AUSTRIAN production from established fields near Vienna continues to decline, with output now sinking below 45,000 bbl. daily.

Except for about 1,000 bbl. daily produced by private operators, the country's crude output is handled entirely by the state-owned OMV. R. Keith van Sickle produces 500 bbl. daily from old properties in eastern Austria. R.A.G., owned jointly by Royal Dutch-Shell and Mobil Oil, produces a total of 500 bbl. daily from three small new fields in Upper Austria.

Most Austrian output is from once-private properties that were confiscated by the Nazis in 1938. Claims by companies have never been resolved. But the government indicates it may resume negotiations soon. Companies are seeking new concessions and other nonmonetary compensation for the property lost to the Nazis.

OMV is adding 40,000-bbl. capacity to its Wien-Schwechat refinery. It also is building a 6,000-bbl. plant at Moosbierbaum.

AUSTRIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A. G. der Shell-Floridsdorfer Mineraloelfabrik—Floridsdorf	4,500	.....	.....	.....	.....
Mobil Oil A.G.—Kagran	*3,400	.....	.....	.....	1,300 V, 140 L, 400 A
Oesterreichische Mineraloelverwaltung A. G.: Korneuburg	7,100	.....	.....	.....	3,800 V, 160 L, 310 A

AUSTRIA REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Lobau	8,650	.....	.....	.....	.....
Moosbierbaum	6,000	6,000	.....	1,600 T	900 V
Schwechat	[1]16,000	5,300 Vis	.....	1,950 T	4,000 V, 500 L, 1,000 A
Richard K. Van Sickle—Neusiedl/Zaya	900	.....	.....	.....	.....
Total	46,550	11,300	.....	3,550	

*All figures on calendar day basis. (1) Adding another 40,000-bbl. crude capacity plus 12,000-bbl. cat cracker and 7,000-bbl. cat reformer.

AUSTRIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Aderklaa, 1939	5,000	....	....	.....	.....	45
Goesting, 1934	4,800	....	....	.....	.....	29
Grubenfelder Neusiedl/Zaya, 1937	2,900	....	....	.....	.....	25.7
Hauskirchen-St. Ulrich, 1938	2,952-3,936	....	....	.....	.....	...
Hohenruppensdorf, 1941	2,296	....	....	.....	.....	...
Kreuzfeld-Pionier, 1943	3,280	....	....	.....	.....	...
Matzen-Auersthal, 1949	4,500	....	....	.....	.....	19-41
Maustrenk, 1941	2,952-3,444	....	....	.....	.....	...
Muehlberg, 1941	5,500	....	....	.....	.....	31
Neusiedl/Zaya, 1939	4,000	....	....	.....	.....	31
Pirawarth, 1958	8,056	....	....	.....	.....	...
Puchkirchen, 1956	7,750	....	....	.....	.....	36.4
Rabensburg, 1955	7,560	....	....	.....	.....	...
Scharfeneck, 1944	3,280	....	....	.....	.....	...
Spannberg, 1956	2,920-7,700	....	....	.....	.....	...
Subrenbrunn-Kagran, 1951	7,870	....	....	.....	.....	...
Wegscheid, 1957	7,757	....	....	.....	.....	...
Zistersdorf-Gaiselberg, 1934	3,444-6,560	....	....	.....	.....	25
Total		178	*591	46,228	35,600,463	

*Includes all artificial lift wells.

BELGIUM—Refining, consuming, but no exploration

BELGIUM continues to have an important role in the European oil picture, both as a refining and consuming country. But no major expansion programs are planned for the immediate future by any refiners. There is no exploration in the country. Brussels has a small voice in the affairs of the international oil world as headquarters of Petrofina, a small integrated company that has been expanding into world-wide operations.

BELGIUM REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Albatros S. A. Belge pour le Raffinage de Petrole, Antwerp-Kiel	14,000	.....	4,500 HD	.....	6,000 V, 700 Poly
Belgium Shell Co., S. A., Ghent	3,000	.....	.....	.....	530 L
Esso Belgium, Antwerp	41,000	.....	10,500 FCC	5,600 Pwr 4,000 T	6,000 Hyd, 2,000 A
Esso Belgium, Hoboken	2,300	.....	.....	.....	.....
Raffinerie Belge de Petroles, S. A., Antwerp	[1]15,000	.....	.....	2,400 T 2,500 SB	3,500 A
Ste. Industrielle Belge des Petroles, Kruisschans-Anvers	90,000	.....	11,500 FCC	10,000 Pf	20,000 V, 10,000 BPH, 3,000 Poly
Tankage & Transport, S. A., Antwerp-Kiel	5,400	.....	.....	750 Pf	.....
Total	170,700	.....	26,500	25,250	

(1) Adding 6,000-bbl. asphalt unit, 5,000-bbl. hydrogenation unit, 700-bbl. LPG unit.

FRANCE—A new era

FRANCE expects to start a new era in its oil history next year when big supplies of crude start arriving from the French Sahara.

One of the first beneficiaries of the new oil wealth may be the French man on the street. The government for years has purposely limited motoring by levying heavy taxes. Motorists in Paris have been paying 74 cents a gallon for regular. But the Saharan oil has a high gasoline yield, and with the prospect of a surplus ahead, serious consideration is being given to lowering taxes.

Construction plans for a 460-mile 30 or 32-in.

FRANCE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Antar Petroles de l'Atlantique, Donges	45,000	.....	10,000 TCC	13,000 HF	400 L
Caltex, S.A.F., Gironde	25,600	.....	5,700 FCC	4,200 T	10,600 V, 600 Poly
Cie Francaise de Raffinage:					
Gonfreville	[1]80,000	9,000 Vis	19,000 FCC	13,000 T	2,150 Poly, 2,500 L
La Mede	130,000	2,000	11,600 FCC	17,000 T 20,000 Pwr	1,200 CH, 1,000 Poly
Cie. Raffinage Shell-Berne:					
Berre l'Etang	75,000	4,700 Vis	11,000 FCC	11,000 T	.....
Pauillac	16,500	.....	.....	.....	.....
Petit Couronne	65,000	.....	12,500 FCC	8,500 T 13,000 CR	11,000 CH
C.F.P.-C.F.R.-Pechelbronn-Antar, Strasburg	[2]	.....	.....	.....	.....
Esso Standard, S. A.:					
Port Jerome	92,000	.....	20,000 FCC	11,900 Pwr	10,800 Hyd, 360 Poly, 3,500 L, 3,900 A
Bordeaux	31,500	.....	.....	4,800 Pwr	2,100 A
Mobil Oil Francaise:					
Gravenchon	21,000	.....	.....	2,300 T 3,900 CR	5,000 CH, 2,300 L
Frontignan	27,000	.....	12,700 TCC	2,200 T	.....
Omnium Francaise de Petroles, Chalon	[3]	.....	.....	.....	.....
Pechelbronn, S. A., Merkwiller	4,600	.....	.....	.....	.....
Royal Dutch-Shell, Strasbourg	[4]	.....	.....	.....	.....
Ste. Francaise des Petroles B.P.:					
Dunkirk	52,000	.....	.....	7,000 T	13,000 V, 1,700 L, 2,000 A
Lavera	104,000	.....	.....	6,000 Pf 5,000 T	.....
Total	769,200	15,700	102,500	122,800	

(1) Adding 62,500-bbl. crude capacity. Due completion April 1960. (2) 60,000-bbl. refinery planned. (3) 60,000-bbl. refinery planned. (4) 60,000-bbl.-daily refinery planned.

FRANCE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Boilwiller, 1958	6,000	....	....	.....	1,300	
Cazaux, 1959	....	....	....	....	....	31.5
Chateaurenard, 1958	1,700	3	....	266	48,111	....
Clermont, 1957	7,500	....	....	....	3,200	....
Coulommes, 1958	6,000	21	....	1,686	395,067	33
Donau-Soufflenheim, 1954	1,650	....	11	113	196,833	30
Eschau, 1956	2,900	1	5	99	114,584	34
Gallician, 1951	6,600	2	....	11	218,371	25
Lacq, 1949	2,200	17	15	1,784	15,752,186	22
Lucats, 1956	7,450	....	1	34	23,581	37.9
Lugos, 1956	5,000	....	6	636	516,554	20.6
Mothes, 1955	7,900	4	....	1,113	824,638	20.9
Parentis, 1954	7,600	19	10	22,621	33,652,116	33.8
Pechelbronn, 1813	600-4,000	4	320	441	22,724,660	27.0
Reimingue, 1955	4,700	1	2	56	99,726	40
Scheibenhard, 1956	3,000	15	1	591	424,476	32
Schirrheim, 1954	1,800	....	....	.....	34,700	29
Staffelfelden, 1952	6,300	....	2	24	399,354	40
St. Martin de Bossenay, 1959	4,500	1	....	490	18,280	32.3
Total France		88	373	29,965	75,447,737	

pipeline from Marseille to Strasbourg have been advanced, and work is to start immediately. The $100 million system is being built by Soc. du Pipe Line Sud-European, composed of eight French and eight foreign companies. An extension will later be built from Strasbourg to Karlsruhe, West Germany.

Two 60,000-bbl. refineries are planned for the Strasbourg terminal. One will be built by affiliates of Mobil Oil, Caltex, and Shell-Berre, and the other by British Petroleum and Pechelbronn-Antar. A Jersey Standard affiliate and a group of other companies each plan refineries at Karlsruhe.

A French company, Omnium Francaise des Petroles, plans to build a refinery midway along the line at Chalon. Jersey Standard also is contemplating a refinery project at Marseille.

A 550-mile 24 and 20-in. natural-gas trunk pipeline has opened on a limited basis. The system carries gas

from Lacq field in southwestern France to Paris and other cities. Lacq reserves are huge, and the field is giving France a sulfur industry as well as a major gas supply.

Drilling in the Paris basin has resulted in the best exploration success sinice the discovery of Parentis 5 years ago. Production from new fields at Coulommes, Chailly, St.-Martin-de-Bossenay, and Chartrettes late this year neared 8,000 bbl. daily.

Esso-Rep, controlled by Jersey Standard, has fully developed Parentis. Output from the field, located in southwest France, has a regulated production of 23,000 bbl. to 24,000 bbl. daily. It faces a productive life of 25 years at this level.

WEST GERMANY—The face is changing

NEW PIPELINES and refineries are changing the face of the West German oil industry.

A new 230-mile crude pipeline from Wilhelmshaven to the Ruhr carried 100,000 bbl. daily to refineries in the country's industrial heartland during the first half of the year. This enabled refiners to step up crude imports more than 60% and reduce imports of gasoline and other products.

A new 183-mile pipeline from Rotterdam into the Ruhr will open late in 1960. This and an extension of the Marseille-Strasbourg crude pipeline should make the country self-sufficient as far as refined products are concerned.

Esso opened a new 72,000-bbl.-daily refinery at Cologne early this year, and a Petrofina affiliate opened a 21,000-bbl. plant at Duisburg-Neuenkamp in November. Esso also plans to build an 84,000-bbl. plant at Karlsruhe, terminal of the pipeline coming northward from Marseille. A 42,000-bbl. plant will be built at the same city by a group of five companies. Deutsche Erdoel will have 25%; Gelsenberg Benzin and Mobil Oil, each 22½%; and Wintershall and Scholven-Chemie, each 15%.

The Gottlieb Duttweiler organization will open a 31,500-bbl. plant at Emden on the North Sea in 1960.

Domestic crude producers have raised production to more than 100,000 bbl. daily, giving West Germany more than twice as much output as any other country in Western Europe. Output is from dozens of small fields, and further discoveries of this type were made this year in the Weser-Ems, Hanover, and Schleswig-Holstein areas.

Bavaria's first refinery has been proposed by Italy's ENI and Bavarian bankers. The plant would be built at Munich as the terminal of a crude pipeline built across the Alps from Italy, via Aigle, Switzerland.

WEST GERMANY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking — Thermal	Cracking — Catalytic	Reforming	Other processing
Badische Anilin & Soda-Fabrik AG, Ludwigshafen, Oppau	1,000	.....	.....	.....	210 L
B.P. Benzin und Petroleum AG: Hamburg-Finkenwerder	42,000	4,500	.....	5,400 CR 3,200 T	5,600 BHP, 1,000 A, 4,900 IS
Dinslaken	(1)	.....	.....	.....	.....
Deitsche Erdoel-AG: Wietze	800	.....	.....	.....	.....
Heide	32,000	.....	7,700	3,400 CR 3,400 Pf	7,800 H, 1,600 L, 320 Poly
Deitsche Shell AG: Monheim/Reisholz	5,500	.....	.....	.....	.....
Godorf	(2)	.....	.....	.....	.....
Hamburg/Harburg	60,000	.....	11,700	7,400 CR 7,500 Pf	7,500 CH, 400 L
Esso AG: Hamburg/Harburg	54,000	.....	11,500	6,500 CR	6,400 Fhy, 1,500 L
Cologne	72,000	.....	.....	7,300 Pwr	13,800 Hyd
Gelsenberg Benzin AG, Gelsenkirchen-Horst	95,000	.....	9,700	15,900 CR	15,300 H, 950 IS, 510 Poly
Gewerkschaft Deurag-Nerag, Misburg	19,000	6,400	2,600	2,800 Pf	180 Poly
Gewerkschaft Erdoel Raffinerie Emsland, Lingen-Holthausen	21,000	.....	18,200	2,800 CR	3,000 HF, 770 Poly, 105 CH
Gottlieb Duttweiler, Emden	(3)	.....	.....	.....	.....
Kleinholz U. Co., Essen-Altenessen	2,500	.....	.....	.....	.....
Mineraloel and Asphaltwerke AG, Ostermoor on Kiel-Canal	3,800	.....	.....	.....	3,800 A
Mineraloelwerke Albert Sengewald, Dedenhausen	5900	.....	.....	.....	.....
Mileraloelwerke Peine, Peine	400	.....	.....	.....	.....
Mobil Oil AG in Deutschland, Bremen-Olebshausen	32,000	.....	7,400	3,400 CR	.....
Oelwerke Julius Schindler G.m.b.H., Hamburg-Neuhof	5,600	.....	.....	.....	400 L, 200 A
Purfina, Duisburg	(4)	.....	.....	.....	.....
Ruhrbau G.m.b.H., Muelheim	6,400	.....	.....	.....	.....
Ruhrchemie AG, Oberhausen/Holten	8,500	.....	3,400	1,800 CR	900 H

WEST GERMANY REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Ruhroel G.m.b.H., Bottrop-Welheim	52,600	.....	.....	800 T	.....
Scholven-Chemie AG, Gelsenkirchen-Buer	42,000	.....	5,100	9,100 CR	9,500 H, 180 Poly
Union Rheinische Braunkohlen Kraftstoff AG, Wesseling	64,000	11,700	.....	5,600 CR 4,200 T	9,500 H, 430 Poly
Wintershall AG, Salzbergen	2,400	.....	.....	.....	.....
Zeller & Gmelin, Eislingen/Fils	170	.....	.....	.....	.....
Total	572,670	22,600	77,300	90,500	

(1) Building 100,000-bbl. refinery, including 17,500-bbl. vacuum, 10,000-bbl. FCC, 10,000-bbl. Platforming, and 3,000-bbl. asphalt. (2) Building a 85,000-bbl. refinery, including Platformer, desulfurization plant, and sulfur recovery plant. (3) Building 31,500-bbl. refinery. Due completion 1960. (4) Building a 21,000-bbl. refinery, including Platformer and CH, completed second half 1959. (5) Not operating.

WEST GERMANY PRODUCTION

Bavaria

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Albaching, 1958	8,200	....	.....	5,352	....
Ampfing, 1954	5,920-6,100	18	1,647	929,392	20
Heimertingen, 1954	5,020-5,120	8	48	145,177	33-37
Hohenlinden, 1959	4,245-7,220	1	34	405	....
Isen, 1954	6,560-6,620	1	1	7,151	18
Lauben, 1959	4,770	2	65	11,445	37
Moenchsrot, 1958	4,800-4,850	6	735	142,837	....
Moosach, 1959	9,660-9,680	....	3	.....	....
Tegernsee, 1883	....	....	.....	32,221	....
Total Bavaria		36	2,533	1,273,980	

Emsland

Adorf, 1948	4,050-4,400	....	.....	50,721	30
Emlichheim, 1944	2,400-9,400	124	2,945	11,290,439	25
Frenswegen, 1958	1,280	....	.....	276	....
Georgsdorf, 1944	1,600-3,300	214	6,056	17,521,964	24-29
Hebelermeer, 1955	3,950	5	476	109,990	29-30
Lingen, 1942	2,300-3,900	242	2,020	9,410,595	30-32
Ruhlermoor, 1949	2,000-4,000	209	8,086	17,917,223	25
Ruhlertwist, 1949	2,350-2,900	121	3,256	8,157,923	25
Scheerhorn, 1949	2,500-3,900	84	3,182	5,966,589	30
Total Emsland		999	26,921	70,425,720	

Hamburg

Hohenhorn, 1954	7,900	....	.....	2,931	....
Reitbrook, 1937	1,400-5,500	115	876	15,001,832	....
Total Hamburg		115	876	15,004,763	

Hanover

Blumenhagen, 1957	443	....	.....	850	....
Broistedt, 1937	3,225-3,285	8	147	527,734	35
Calberlah, 1945	160-400	8	7	61,744	22
Eddesse, 1896	500-3,300	68	733	3,852,006	26-34
Eicklingen, 1937	1,650-3,100	14	208	2,461,927	32-33
Eilte, 1947	3,560-5,676	19	1,115	734,911	23-35
Eilte-West, 1956	....	....	.....	.....	....
Eldingen, 1949	4,900-5,300	45	1,846	5,585,208	35
Fuhrberg-Hambuehren, 1939	260-2,170	235	564	5,807,451	22-23
Gifhorn, 1935	650-1,000	20	27	408,216	16
Hademstorf, 1941	4,100-5,400	10	84	840,930	25-29
Hankensbuettel, 1954	5,026-5,280	61	7,322	8,648,679	33
Hardesse, 1957	6,070	1	68	42,362	34
Hillerse-Nord, 1958	....	....	.....	.....	....
Hohenassel, 1943	1,450-2,100	32	310	2,440,370	31
Hohne, 1951	4,495	45	4,330	9,095,304	33-34
Lehrte, 1952	3,640-4,026	60	1,353	1,478,120	31
Leiferde, 1956	2,700-2,736	23	2,563	1,109,710	34
Lueben, 1955	4,200-4,757	14	1,170	1,002,287	35-38
Meckelfeld, 1938	1,000-8,600	27	465	654,911	24-32
Meerdorf, 1954	5,565-5,574	11	54	39,554	42
Moelme, 1935	3,965-3,980	11	311	1,235,349	26
Nienhagen, 1899	600-5,350	210	5,648	41,342,942	22-32
Oberg, 1918	500-1,900	51	99	2,775,637	36-46
Oerrel-Sued-Wesendorf-Nord, 1954	4,460-4,700	40	1,489	1,516,024	....
Rautheim, 1955	330	1	3	5,773	....
Rietze, 1956	6,000	....	.....	2,032	....

WEST GERMANY PRODUCTION (Continued)

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Ruhme, 1954	1,985-2,297		35	510	914,015	...
Steimbke, 1936	790-3,700		180	765	7,939,596	18
Stemmerberg, 1948	4,000		...	...	1,119	16
Suderbruch, 1949	3,800-7,650		78	2,603	9,204,648	19-38
Thoeren, 1941	1,550-4,100		47	227	2,137,815	31
Vechelde, 1954	6,000		...	...	15,604	31
Vorhop, 1952	5,085-5,197		19	1,621	1,496,692	36
Wesendorf, 1943	1,200-6,300		73	1,300	7,058,288	17-42
Wietze, 1879	300-1,000		54	445	18,598,494	16-29
Total Hanover			1,500	37,387	139,036,802	
Schleswig-Holstein						
Boostedt-Ploen, 1952	5,500-6,300		39	3,116	6,991,348	29-34
Bramstedt, 1954	6,250-6,503		21	1,982	2,659,312	34-35
Heide, 1935	2,600-5,900		79	1,147	14,017,366	21-32
Kiel, 1955	5,750-5,800		14	539	362,201	32
Schwedeneck, 1956	5,128		16	739	405,576	25
Warnau, 1957	8,200		1	28	26,590	35
Ploen-Ost, 1959	8,300-9,186		4	290	48,266	36
Total Schleswig-Holstein			174	7,841	24,510,659	
Upper Rhine Valley						
Beuchenau, 1959	...		...	...	1,193	...
Dudenhofen, 1952	2,812-6,300		2	73	18,452	26-27
Forst-Weiher, 1934	1,200-2,600		46	11	675,689	32-34
Hayna, 1957	4,500-4,700		3	...	14,827	39
Huttenheim, 1936	5,300		1	8	22,958	31
Landau, 1955	3,400-6,400		45	1,858	1,259,442	36
Leopoldshafen, 1957	3,100-4,000		4	175	105,757	40
Minfeld, 1956	2,700		11	111	94,569	...
Offenbach, 1958	3,346-3,520		7	101	28,885	36
Rot, 1953	2,100-2,500		10	66	366,458	25-26
Stockstadt, 1952	1,600-5,600		24	1,027	2,267,391	39
Wattenheim, 1954	7,500		2	...	59,857	...
Weingarten, 1936	800-3,600		29	32	484,036	31-34
Eich, 1959	6,840		6	28	1,299	...
Graben, 1959	4,770-4,826		1	40	277	...
Hofheim, 1958	...		2	82	1,953	...
Knielingen, 1959	4,790-4,813		1	36	4,118	...
Maximiliansau, 1958	4,245-4,475		1	28	1,534	...
Neoreot, 1958	2,795		1	64	11,807	...
Rheinzabern, 1959	3,707-3,882		1	11	1,626	41
Total Upper Rhine Valley			195	3,751	5,423,122	
Weser-Ems						
Barenburg, 1953	2,300-2,550		43	3,106	3,674,758	29
Bockstedt, 1954	3,900		13	459	637,534	...
Bramhar, 1958	2,560-3,300		8	606	72,365	29
Dickel, 1953	2,953-4,593		27	238	150,377	...
Dueste, 1954	2,800-4,200		195	6,309	8,911,100	...
Elsfleth, 1956	4,921-5,138		11	583	330,752	24-26
Etzel, 1942	4,550-4,700		1	...	382,319	13
Hemmelte-West, 1951	3,700-4,500		50	2,354	6,017,304	32
Liener-Garen, 1953	2,600-4,500		11	106	266,279	28-31
Molbergen, 1953	2,400-5,200		18	263	521,614	26
Ortland, 1956	5,350		19	675	462,516	32
Ostenwalde, 1953	4,200-4,960		35	797	667,512	...
Oythe, 1956	3,700		2	11	18,832	28.5
Quakenbrueck, 1950	1,270-1,450		4	26	307,138	35
Siedenburg, 1956	2,300-6,600		21	476	284,783	25.5
Varel, 1957	5,072-5,138		7	286	86,949	26-29
Vechta, 1955	5,200-6,500		36	2,743	970,986	39
Voigtei, 1953	1,500-1,700		97	3,205	3,865,824	31-34
Wehrbleck, 1957	3,380		14	409	89,418	...
Diepholz, 1957	....		4	87	51,419	...
Total Weser-Ems			616	22,739	27,769,779	
Total West Germany			3,635	102,048	283,444,825	

GREECE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Oil Transport Trading & Refining Co., Aspropyrgos	30,000	.....	.....	8,200 Cat	500 A
Total	30,000	.....	.....	8,200	

ITALY—Two projects proposed

ITALY may some day serve as a starting point for a pipeline which would transport crude oil northward into central Europe.

Two projects have been proposed. Enrico Mattei, dynamic head of the state-owned ENI, is working for a system running northward from Genoa that will move 240,000 to 280,000 bbl. daily to refineries in northern Italy, Switzerland, and southern Germany. The line is to handle ENI crude Mattei expects to develop in Iran, Egypt, or some other country where his company has won concessions. The section from Genoa to Aigle has already received approval from the Italians.

A rival project would start at Venice and run northward into Austria in conjunction with a proposed superhighway. From Austria the line runs into Germany.

ENI plans to build a refinery and petrochemical center at Gela field in southern Sicily. The field is still expanding, and much of the development drilling is being done from an offshore barge. Gulf Oil's neighboring Ragusa field continues to be the country's most important source of crude. British Petroleum this year gave up its exploration program in Sicily.

Royal Dutch-Shell has purchased one of Italy's most modern refineries, the 45,000-bbl. Condor plant near Milan. One of the biggest petrochemical developments in Europe is being built by Montecatini at Brindisi. The $95,000,000 complex will produce 700,000 tons of chemicals a year.

ITALY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
AGIP Mineraria SPA:					
Gela (Sicily)	2,500	.....	.....	.....	.....
Cortemaggiore	3,000	.....	2,000 TCC	.....	.....
Anonima Petroli Italiani (API), Falconara	33,000	7,500 Vis	.....	[1]4,000 T	5,100 V, 3,400 A
Aquila Societa Technico-Industriale, Trieste	25,000	.....	5,000 TCC	5,000 Pf 3,000 T	6,500 L, 2,000 A, 4,500 V, 5,000 Un, 1,400 Poly
Condor SPA per l'Industria Petrolifera y Chimica, Rho	45,000	.....	12,000 TCC	6,000 Pf	6,000 CH, 400 Poly
Delle Piane, Genoa	1,000	.....	.....	.....	.....
Distilleria Italiana Catrami (DICA), Carrara	9,200	500	.....	.....	.....
Esso Standard Italiana, Trieste	6,000	.....	.....	1,000 Pwr	1,300 V, 560 L, 500 A
Garrone, Genoa	25,800	.....	.....	5,600 Pwr	2,000 Hyd, 300 L, 450 A
Industria Chimica Italiana del Petroleo (ICIP), Mantova)	20,000	.....	.....	2,000 Pf	.....
ILSEA, Como	2,700	300	.....	500 Cat	.....
IPLOM, Genoa	[2]7,000	.....	.....	.....	.....
Industria Raffinaria Oli Minerali (IROM), Porta Marghera (Venice)	36,000	.....	.....	7,600 T [3]2,000 Pf	7,000 V, 1,600 Poly, 300 L, 450 A, 6,500 CH
Italia Raffineria Olii Minerali, SPA, Cremona	29,300	.....	.....	3,500 T	400 Poly
Lombardia Petroli, Milan	5,800	.....	.....	650 T	.....
Mobil Oil Italiana, Naples	113,700	.....	15,000 TCC	7,500 T 11,000 CR	[4]2,900 V, 11,000 CH, 1,000 Poly, 400 L, 500 A
NILO, Milan	10,000	.....	.....	.....	.....
Petroli d'Itali Fiorenzoula d'Arda	5,000	2,000	.....	720 T	.....
Purfina Italiana, SPA:					
Genoa	11,000	.....	1,800 TCC	1,500 CR	1,100 A
Milan	8,000	.....	.....	.....	3,000 V, 500 L, 1,000 A
Rome	[5]11,000	.....	1,800 TCC	720 CR	1,250 A
Raffineria Oli Lubricanti (ROL), Viguzzolo	1,400	.....	.....	.....	380 L
Raffineria Siciliana Oli Minerali, (RASIOM), Augusta	100,000	10,000 Vis	.....	6,500 T 8,000 Pwr	5,000 A, 10,000 V, [6]8,000 Hyd, 800 Poly
Raffineria Volpato, Milan	2,100	.....	.....	.....	.....
San Quirico, Genoa	4,500	.....	.....	.....	.....
S.A.R.O.M., Ravenna	48,000	5,000 Vis	.....	2,000 T 4,000 HF	.....
Getty Oil Italiana, Gaeta	[7]30,000	.....	.....	3,000 Pf	.....
Sta. per Azioni Raffineria Padana Oli Minerali (SARPOM), Novara	22,000	.....	4,600 FCC	4,000 T	9,500 V, 430 Poly
S.I.R.O.M., Milan	1,500	.....	.....	.....	.....
Sta. Petrolifera Italiana, Fornovo Taro	2,500	.....	.....	1,500 T	.....

ITALY REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Sta. per l'Industria del Petroleo (INPET), La Spezia	40,000	.....	.....	3,000 T 6,700 Pf	.....
Stanic Industria Petrolifera:					
Bari	49,000	.....	.....	.....	.....
Leghorn (Livorno)	47,000	.....	.....	4,000 T 8,900 Fhy	3,000 V, 7,960 Un, [8]2,100 L, 1,000 A
S.T.O.I., Florence	15,000	.....	.....	7,300 Pwr	7,220 Hyd
Total	773,000	25,300	42,200	121,190	

(1) Adding 4,000-bbl. Hydroformer. (2) Building 10,000-bbl. crude unit, 2,000-bbl. Platformer. (3) Adding 4,000-bbl. Platformer. (4) Adding 4,700-bbl. vacuum unit, plus 600-bbl. lube plant. (5) Plan to replace with new 30,000-bbl. refinery. (6) Plan to add 10,000-bbl. Esso Hydrofiner. (7) Plan 10,000-bbl. crude expansion. (8) Adding 200-bbl. lube capacity.

ITALY (SICILY) PRODUCTION—

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Cortemaggiore, 1949	5,000-6,380	.....	.....	.....	.....	36.9
Ripi, 1915	730	.....	.....	(*)	.....	.....
S. Giorgio, 1943	3,000	.....	.....	(*)	.....	.....
Tramutola, 1936	680	.....	.....	(*)	.....	.....
Ragusa (Sicily), 1954	6,255	.....	42	21,800	23,980,940	19.5
Gela (Sicily)	10,800	.....	.....	.....	.....	8.8
Alanno, 1956	1,700	.....	.....	.....	.....	20.6
Bussefo, 1956	4,930	.....	.....	.....	.....	41.0
Ponte Dirillo (Sicily), 1958	10,050-10,350	.....	.....	.....	.....	12.0
Total		[1]59	[1]54	28,200	33,328,489	

*Shut in. (1) Estimated.

NETHERLANDS—The industry grew

THE NETHERLANDS refining industry grew this year with the completion of a major expansion program at Caltex' Pernis refinery. Another important addition to the country's refining capacity will be made in 1960 when Jersey Standard opens a new 95,000-bbl. plant at Rotterdam. Royal Dutch-Shell, the biggest refiner, has opened up a new laboratory for plastics at Delft.

More than a third of the country's 33,000-bbl. daily crude production comes from a group of small fields found by a joint Shell-Jersey company in the Rotterdam area. This play may be extended to adjacent offshore areas.

NETHERLANDS REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Caltex Pet. Maatschappij (Nederland), N.V., Pernis	59,000	9,000	.....	7,500 T 7,500 Pf	4,500 Un, 950 Poly
Esso Nederland, Rotterdam	(1)	.....	.....	.....	.....
N.V. de Bataafsche Petroleum Mij., Pernis	300,000	20,000	77,000 FCC	10,000 T 12,700 Pf	24,200 H
Total	359,000	29,000	77,000	37,700	

(1) 100,000-bbl.-daily refinery due on stream early in 1960. Units include 16,500-bbl. Powerformer and 16,500-bbl. Hydrofiner.

NETHERLANDS PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Alblasserdam, 1957	4,800	.....	.....	.....	12,214	25.2
Andel, 1953	3,100-4,800	.....	.....	.....	5,948	12.7-31.7
Berkel, 1954	3,100-3,700	.....	3	65	122,584	32.1
Delft, 1954	3,100-3,800	1	2	24	95,492	31.9-32.5
De Lier, 1955	5,200	2	15	1,420	1,181,727	34.5
Ijsselmonde, 1956	3,100	13	.....	4,472	1,672,050	19.8
Moerkapelle, 1957	2,400-4,400	.....	5	101	40,112	14.1-29.3
Meyendel, 1958	4,200	1	.....	68	16,981	18.2
Pijnacker, 1955	5,800	4	.....	1,153	1,531,630	36.3
Ridderkerk, 1957	5,000	3	.....	151	127,286	26.6
Rijswijk, 1953	2,500-5,100	.....	7	1,157	2,017,161	23.5-32.3
Schoonebeek, 1943	2,500	.....	282	20,305	70,430,368	25.0
Wassenaar, 1956	4,200	15	1	3,713	1,939,124	18.4
Werkendam, 1958	6,500	.....	1	27	11,201	33.0
Zoetermeer, 1957	3,200	.....	7	962	398,437	16.5
Total		39	323	33,618	79,602,315	

*Includes all artificial lift.

SPAIN—A new oil law

SPAIN has passed a new oil law based on the widespread 50-50 profit split, and about 20 companies late this year were awaiting a decision on applications for open areas of the Spanish mainland and the country's African possessions.

Eight rigs have been drilling wildcats in Spain itself, on licenses granted under the old law. Encouraging shows were found at midyear in 1 Retuerta, a test drilled north of Burgos by Valdebro.

Gulf Oil formed a partnership with a private Spanish company, CEPSA, to explore a 14.8-million-acre concession already held by CEPSA. The two companies were the first to win a concession under the new law, with an award over 328,000 acres in Spanish Guinea.

There have been no discoveries in Portugal, where Mobil Oil is carrying on an exploration program for Cia. de Petroleos de Portugal.

SPAIN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Cia. Espanola de Petroleos, S.A., Santa Cruz de Tenerite, Canary Islands	[1]61,500	2,000		5,000 Pf	2,500 V, 500 L, 3,000 A
Refineria de Petroleos de Escombreras, S.A., Escombreras	[2]84,000			9,000 T 11,000 Pf	4,000 V, 460 Poly
Total	145,500	2,000		25,000	

(1) Plan addition of a 56,000-bbl. crude capacity, 15,000-bbl. Platformer, 15,000-bbl. Unifiner. (2) Plan additional 35,000-bbl. crude unit, 4,500-bbl. vacuum unit.

PORTUGAL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Salor, S. A., Lisbon, Cabo Ruivo	22,900		10,600 TCC		1,400 Poly, 190 L
Total	22,900		10,600		

SCANDINAVIA—Big demand, big threat

THE HIGHEST per capita consumption in Europe, growing demand, and the threat of Russia competition from a pipeline to the Baltic are some of the reasons why a refining industry is growing rapidly in Scandinavia.

Jersey Standard already has a 40,000-bbl. refinery under construction south of Oslo, Norway. Royal Dutch-Shell this year moved to buy half interest in Kopportranz big Swedish plant. Tidewater has decided to build a 20,000-bbl. plant on Denmark's Island of Zealand, about 62 miles west of Copenhagen. This is planned for completion in 1961.

Jersey Standard has given up an exploration program in Denmark after drilling a flock of dry holes. The company had taken over Danish American Prospecting Co. from Gulf Oil in 1957.

FINLAND REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Neste Oy Corp., Turku	25,000		[1]12,000 TCC	3,400 Cat	13,000 V, 500 Poly
Total	25,000		12,000	3,400	

(1) 9,000 bbl. fresh feed.

SWEDEN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A. B. Nynas-Petroleum: Nynasham	[1]14,000	1,000		1,900 T	2,500 V, 650 L, 1,900 A
Malmo	1,950				

SWEDEN REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Gothenburg	2,900	.....	.....	.....	
Kopportranz Oljeaktiebolag—Sharvik	29,000	.....	.....	4,400 T 5,500 Cat	.....
		.....	.....		
Total	47,850	1,000	.....	11,800	

(1) Adding 20,000-bbl. crude unit, 6,850-bbl. Platformer, and 1,400-bbl. lube unit.

DENMARK REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A/S Dansk Mineraloliefabrik—Copenhagen	60	.....	.....	.....	60 L
A/S Kalundberg Olienaffinaderi-Kalvanborg	500	.....	.....	.....	.....
Dansk Veedol—Kalundberg	(1)	.....	.....	.....	.....
Total	560	.....	.....	.....	

(1) Tidewater subsidiary building 20,000-bbl. refinery to open in 1961.

NORWAY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
A/S Esso-Raffineriet, Norge—Slagenslagen a Naess	(1)	.....	.....	.....	.....
Norske Esso A/S—Valloy Pr. Tonsberg	2,000	.....	.....	.....	300 L
Total	2,000	.....	.....	.....	

(1) Building 40,000-bbl. refinery.

UNITED KINGDOM—Expansion meets demand

THE BRITISH refining industry continues to expand to meet fast-growing demand in Europe's best market.

Construction is concentrated at Milford Haven, Wales, a natural protected harbor that can take 100,000-ton tankers without costly dredging. Esso Petroleum is building a 100,000-bbl. refinery at Milford Haven. British Petroleum has made the port a terminal for a newly completed 60-mile 18-in. pipeline that will move 100,000 bbl. daily of crude to its Llandarcy refinery, near Swansea.

Royal Dutch-Shell completed a major expansion program at Shell Haven refinery this year when it opened a new crude unit that increased the capacity from 80,000 bbl. to 160,000 bbl.

Shipments of liquefied methane have been proven commercially and technically feasible by an experimental ship owned by the British Gas Council and Constock International Methane. Within a matter of a few years imports of natural gas from Venezuela, the Middle East, or elsewhere are expected to be an important supplement to local coal gas supplies.

Oil has been discovered in southern England for the first time in a small find at Kimmeridge Cliffs. BP has conducted a seismic survey in the immediate offshore area.

Ireland . . . A 40,000-bbl. daily refinery at Whitegate Bay, Cork, has been opened by Esso, Caltex, and Shell-Mex, and BP. The plant is big enough to cover the country's anticipated needs for years to come.

UNITED KINGDOM REFINING
(Barrels per stream day)

England

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Berry Wiggins & Co., Ltd.: Kingsnorth on Medway, Kent	[1]3,600	.....	.....	.....	2,400 V, 300 L, 1,600 A
Weaste	3,200	.....	.....	.....	2,000 V, 250 L, 1,200 A
B. P. Refinery (Kent), Ltd., Isle of Grain	200,000	.....	.....	12,000 T 16,000 Pf	34,000 V, 2,500 Alky, 2,750 L, 20,000 CH
Esso Petroleum Co., Ltd., Fawley	244,400	.....	49,000 FCC	6,000 T 21,000 Pwr 15,000 Fhy	73,100 V, 29,500 Hyd, 4,000 Poly, 4,240 L, 2,270 A
Lobitos Oilfields, Ltd., Ellesmere Port	4,200	800	.....	800 Pf	1,100 V, 650 L, 150 A
Manchester Oil Refg., Ltd., Manchester	3,500	.....	.....	.....	2,500 V, 1,500 L
Mobil Oil Co., Ltd., Coryton	42,000	.....	10,500 TCC	6,000 CR	21,000 V, [2]2,800 L

UNITED KINGDOM REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Shell Refg. & Marketing Co., Ltd.:					
Heysham	36,000	6,000 Vis		4,000 T	
Androssan	3,200				
Shell Haven	160,000			13,000 T 6,700 Pf	(3)
Stanlow	105,000		35,000 FCC	13,000 T 10,000 Pf	
Total	805,100	6,800	94,500	118,500	

(1) Adding 600-bbl. crude unit. (2) Adding 500-bbl. lube plant. (3) 16,000-bbl. hydrodesulfurizer due on steam early 1960.

Scotland

Grangemouth Petroleum Ref., Grangemouth	84,000		12,500 FCC		24,000 V, 500 CH, 2,202 Poly
Scottish Oils, Ltd., Pumperston	[1] 3,500	1,500			[2] 15 C
Total	87,500	1,500	12,500		

(1) Feed stock includes shale oil. (2) Tons daily.

Wales

B. P. Refinery (Llandarcy), Ltd., Llandarcy	70,000		12,500 FCC	6,000 Pf	24,000 V, 500 A, 2,000 L, 3,500 CH
Esso Petroleum Co., Ltd., Milford Haven	(1)				
Total	70,000		12,500	6,000	
Total United Kingdom	962,600	8,300	119,500	124,500	

(1) 100,000-bbl. refinery under construction, to include 16,500-bbl. Powerformer, 16,500-bbl. Hydrofiner.

UNITED KINGDOM PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Bothamsall, 1958	3,215-3,256					40.4
Caunton, 1943	2,000-2,200					27.8
Corringham, 1958	4,385-4,433					39.1
Duke's Wood, 1941	1,800-2,500					33.6
Eakring, 1939	1,800-2,500					33.6
Egmanton, 1955	3,100-3,400					39.1
Formby, 1939	85-130					34.1
Gainsborough, 1959	4,600	1				
Kelham Hills, 1941	2,000-2,500					27.8
Langar, 1958						28.0
Plungar, 1953	2,800-3,080					32.2
Total United Kingdom		1	231	1,651	8,785,539	

IRELAND REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Irish Refining Co., Ltd., Whitegate	40,000			9,000 Pwr	5,380 Hyd.
Total	40,000			9,000	

RUSSIA, SATELLITES—Edging out Venezuela

RUSSIA is edging out Venezuela as the world's second-ranking crude producer behind the U. S., and the trickle of Soviet exports into foreign markets is becoming larger.

Capacity of Soviet fields still is considerably below Venezuela's. But Communist determination to push output to the maximum limit means that its actual production will probably exceed Venezuela's long before Russian productive capacity becomes the larger of the two. There is little doubt that Russia will meet its goal of 144 million tons of crude in 1960, which is about 2,880,000 bbl. daily.

Exports of crude and products to satellites, Communist China, and free world countries last year averaged 363,000 bbl. daily. This was a gain of 32% in 1 year, with most of the increase going to free-world customers. Export figures for this year undoubtedly will show another big gain.

Thousands of miles of big-inch crude and natural-gas pipelines are under construction. The first big refinery in Central Siberia, at Angarsk, will take feed late next year from a 2,300-mile 28-in. trans-Siberian pipeline originating in Second Baku fields west of the Ural Mountains.

Another pipeline from Second Baku will extend to Klaipeda on the Baltic Sea. This will be a factor in the competitive struggle for European markets. Russian oil sold to Iceland and Scandinavia now is shipped from Black Sea ports. A refinery being built on the Baltic will enable Russia to export either crude or products from that point.

Expansion of the natural-gas-transportation systems includes a 4,000-mile network that will supply gas in the South and Central Urals from fields in the Bukhara-Khiva depression. The first section now opening will supply gas to the ancient cities of Bukhara and Samarkand. Gas output the first 9 months of this year averaged 3.4 billion cubic feet daily, up 24% over last year.

European satellites . . . Construction has started on a 2,500-mile big-inch line from Russia's Second Baku to Eastern Europe.

The system will be able to deliver up to 300,000 bbl. daily when it is completed 4 years from now. It will supply crude to East Germany, Poland, Czechoslovakia, and Hungary. Each satellite will pay for the section within its own borders. Czechoslovakia has started laying pipe in the project, with a spread working westward from the Russian frontier.

The system will consist of a single line running eastward from the Volga to the Dneper River. It will then split. The northern branch will extend to Plock, Poland, and Schwedt, East Germany. Refineries with initial capacities of 40,000 bbl. daily are planned for both cities. The southern branch will feed a number of small plants in Czechoslovakia, and a feeder will extend to a proposed 20,000-bbl. plant at Budapest, Hungary.

Crude production in these four countries is relatively small. Hungary produces the most oil, and output is scheduled to rise gradually to 35,000 bbl. daily in 1965.

The Romanian oil industry has been marking time due to a lack of fresh discoveries. Output of 227,000 bbl. daily last year was a gain of less than 2%, and there appears to be little chance that the 1960 goal of 270,000 bbl. daily will be realized.

Preliminary work has started on a 16,000-bbl. refinery to be built in Bulgaria. The plant will be fed by small local production supplemented by Soviet oil. Successful drilling in Albania has led the country to plan for output of more than 15,000 bbl. daily next year.

Red China . . . Official Communist Chinese reports claim crude production the first 9 months of this year exceeded the 2,260,000 metric tons produced all last year. This level would give the country a January-September average of more than 60,000 bbl. daily.

The gain is largely the result of stepped-up production from Karamai fields in Dzungarian basin, located in the remote Sinkiang region of northwest China. Output from Karamai has been running 150% ahead of last year.

The country's biggest refinery, a 20,000-bbl. plant, has opened at Lanchow. Despite the gains in production and refining, half the country's oil is supplied by the Soviet Union. Last year imports averaged 13,400 bbl. daily of crude, and 36,700 daily of products.

YUGOSLAVIA—Small, progressive industry

YUGOSLAVIA, the only Communist country in Europe to resist Russian domination, is making progress in its oil development. But the industry still is a small one. Output rose gradually over most of the year reaching a level of about 12,000 bbl. daily. The crude is refined in three small plants.

YUGOSLAVIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Rafinerijanafte Sisak, Sisak	5,000				
Rafinerijanafte Boris Kidric, Rijeka	3,000				420 L, 350 A
Rafinerijanafte Bosanski Brod, Bosanski Brod	2,100				700 V, 350 A
Total	10,100				

MIDDLE EAST

BAHRAIN—Reached middle age

BAHRAIN ISLAND has reached middle age as an oil-producing country, and there is little chance that the shaikhdom ever will produce more than the present 45,000 bbl. daily. Large gas reserves lie untapped in pre-Permian formations below 10,000 ft. But the only remaining hope for additional oil would be from drilling

BAHRAIN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Bahrain Petroleum Co., Ltd., Bahrain	186,500	16,020 19,950 Vis	27,300 FCC	10,450 Pf	10,450 Un, 2,050 Poly, 1,990 A
Total	186,500	35,970	27,300	10,450	

BAHRAIN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Bahrain Zone, 1932	2,200	142	....	44,659	218,408,078	33.0
Fourth Pay, 1936	4,500	3	....	507	3,210,720	36.0
Total		145	....	45,166	221,618,798	

at some future time in the waters between the island and Saudi Arabia.

The biggest operation of Bahrain Petroleum Co., a member of the Caltex group, is running the big 186,500-bbl.-daily refinery. This is supplied largely by a pipeline system from Saudi Arabia.

IRAN—Past the million mark

IRANIAN CRUDE PRODUCTION passed the 1-million-barrel daily mark on a monthly basis for the first time late this year, and every effort is being bent to make sure the country's productive capacity will keep right on growing.

Iranian Oil Exploration Co., one of the two operating companies of the Iranian consortium, has had two wildcats drilling and a third planned on widely separated structures near the Persian Gulf, at Binak, Mund, and Bandar Abbas. The Binak and Mund wells are in progress, with Binak an indicated discovery. Binak tests indicate a potential of 4,000 to 6,000 bbl. daily.

Work is progressing on a 96-mile pipeline outlet from Gach Saran field to Kharg Island. The 26, 28, and 30-in. system has been complicated because 25 miles are underwater, including one 19-mile 30-in. section from Ganaveh to Khargu, an island 3 miles from Kharg. Initial capacity of the system will be 330,000 bbl. daily.

National Iranian Oil Co. this year opened two vast districts of its interior to competitive bidding this year, each of them covering tens of thousands of square miles. They were Districts 14 and 18, and proposals were sought under a variety of concession arrangements offered by the country's oil law.

NIOC is also drilling in its own program on acreage reserved for itself in northern Iran. The company is drilling 8 Alborz on the structure that had one of the most spectacular blowouts in modern times 3 years ago. It also has 3 and 4 Sarajeh drilling on a gas-condensate discovery 30 miles southeast of Alborz. NIOC

IRAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Iraanse Aardolie Raffinage Maatschappij N.V. (Iranian Oil Refining Co.):					
Abadan	415,000	.....	35,000 FCC	81,000 T	74,000 V, 5,000 A, 10,000 Alky, 450 A
Masij-i-Salaiman	75,000	.....	.....	.....	.....
National Iranian Oil Co., Kermanshah	5,000	.....	.....	.....	.....
Total	495,000	.....	35,000	81,000	

IRAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Agha Jari, 1937	4,900-10,000	28	....	583,919	1,144,182,299	34.2
Alborz (Qum), 1956	8,500	(1)	....	.....	.....	...
Gach Saran, 1928	2,800-10,000	24	....	57,453	185,078,522	32.3
Haft Kel, 1928	1,900-4,900	20	....	142,245	1,171,597,980	35.2
Lali, 1938	4,000-9,000	4	....	16,357	33,531,461	37.0
Masjid-i-Sulaiman, 1908	680-5,300	20	....	58,166	931,826,898	37.4
Naft Safid, 1935	3,000-7,000	13	....	58,600	93,958,737	35.2
Naft-i-Shah, 1935	2,100-3,000	4	....	5,119	55,187,452	41.9
Sarajeh, 1958	8,000-8,590	(3)	.....	.....	.....	...
Total		93	....	922,349	3,615,363,349	

(1) Iran Oil Co. discovery. Not on production. (2) 12 wells shut in awaiting pipeline completion. (3) One well, IOC discovery. Shut in.

has developed 25,000 bbl. daily production in Naft-i-Shah field, but actual output has been only a fraction of this level.

Indiana Standard has started a wildcat in a new concession in the Persian Gulf, and the well has been drilling ahead below 3,000 ft. The joint Iranian-Italian company, SIRIP, has spudded its first well in a concession in the Zagros Mountains. Drilling had been delayed because of the inaccessibility of the site, located on top of 8,200-ft. Mt. Sequta.

IRAQ—Smooth operation despite politics

DESPITE unsettled political conditions in Iraq, oil-industry operations have run smoothly.

Iraq Petroleum Co. and its affiliates, Basrah Petroleum and Mosul Petroleum, have all been pushing exploration, transportation, and field-development programs in their respective areas. Facilities are under construction in southern Iraq that will increase offtake from Rumaila and Zubair fields from the present 240,000 bbl. daily to 440,000 bbl. daily. A deep-water terminal is being erected 24 miles out in the Persian Gulf, and a 30 and 32-in. pipeline is being added to the existing system from the southern fields.

An extensive looping program also is under way on the pipeline system leading from Kirkuk field to terminals on the Mediterranean. By the end of 1960 capacity of the system will be increased from 500,000 bbl. daily to 700,000 bbl. daily. Development drilling is in progress at Kirkuk, and wells are being drilled for a water-flood project. This may some day be the world's largest flood, with injection of more than 500,000 bbl. daily in the early stages.

A wildcat 25 miles north of Kirkuk tested 2,000 bbl. daily from Upper Cretaceous at 4,900 ft. and was being deepened in search of the main Cretaceous pay productive in Ain Zalah. The well is 13 Bai Hassan, which was spotted at a crestal location in a field that already has nine shut-in wells.

A small, 58-year-old concession held by British Petroleum in eastern Iraq has been turned over to the Iraqi Government. The operating company, Khaniqin Oil, turned over Naft Khaneh field under the terms of a standing agreement that stipulated BP give up its rights if production did not reach 40,000 bbl. daily by a specified date. Output is about 4,500 bbl. daily.

IRAQ REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Government Oil Refineries Administration:					
Baghdad	[1]30,000	15,000 Vis	.....	10,000 5,000 Pwr	15,000 V, 500 L, 200 A[2]
Quaiyarah	3,000	.....	.....	.....	2,000 V
Iraq Petroleum Co., Ltd.:					
K. 3 (Haditha)	6,450	.....	.....	.....	.....
Kirkuk	2,880	.....	.....	.....	.....
Khanaqin Oil Co., Ltd.:					
Khanaqin	10,250	.....	.....	.....	.....
Muftieh Depot, Basrah	3,250	.....	.....	.....	.....
Total	55,830	15,000	.....	15,000	

(1) Adding 24,000-bbl. crude unit. (2) Tons per year.

IRAQ PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Ain Zalah, 1939	5,800	4	.....	17,000	47,285,000	31.8
Bai Hassan, 1953	4,850	(1)	.....	.....	.....	.....
Butmah, 1952	5,150	4	.....	8,000	9,707,000	30.2
Jambur, 1954	5,700	(2)	.....	.....	.....	.....
Kirkuk, 1927	2,800	38	.....	541,000	1,690,362,000	36.1
Naft Khaneh, 1923	3,000	2	.....	3,300	58,911,000	42.0
Rumalia, 1953	10,800	14	.....	163,000	168,927,000	34.7
Zubair, 1949	11,000	23	.....	91,000	225,637,000	35.9
Total		85	.....	823,300	2,201,829,000	

(1) Six-well field. Shut in. (2) Four-well field. Went on production in August.

ISRAEL—Financing is arranged

FINANCING was arranged this year for expansion of a crude-oil pipeline system from the Gulf of Aqaba to Haifa refinery on the Mediterranean Coast. A 125-mile 16-in. section from Elath to Beersheba will replace an 8-in. section built 2 years ago. The project will increase capacity of the 250-mile system from 30,000 bbl. to 100,000 bbl. daily after completion.

The 87,000-bbl. Haifa plant is to process oil for export for the first time since the Israeli-Arab war 12 years ago, under a new agreement with an unidentified western European company. The purchase contract covers 3 million barrels of products per year, and

ISRAEL REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Paz Oil Co., Ltd., Haifa	87,000	.....	.....	20,000 T	5,000 V, 1,000 A
Total	[1]87,000	.....	.....	20,000	

(1) Throughput averages about 30,000 bbl. daily.

ISRAEL PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Heletz, 1955	.....	6	17	2,000	1,487,000	31
Total		6	17	2,000	1,487,000	

negotiations have been started for a possible plant modernization program. Runs have been limited to local demand of about 30,000 bbl. daily.

A small gas discovery west of the Dead Sea may be developed commercially to supply nearby industries. Four wells at Zohar have an expected gas yield equivalent to about 1,900 bbl. of oil daily, which is in the same class as Israel's only oil field at Heletz.

KUWAIT—Third ranking oil producer

MAJOR new crude-producing and handling facilities are coming into operation in Kuwait, which already is the free world's third-ranking oil country, behind the United States and Venezuela.

Initial production from a 25-well field at Raudhatain in northern Kuwait will be on the order of 125,000 bbl. daily. But this is only a fraction of the field's potential, with individual wells testing from 14,000 bbl. to 20,000 bbl. daily. A new 63-mile 30-in. pipeline from Raudhatain has been built to the new five-berth North Pier.

The prolific Burgan and Magwa-Ahmadi area will continue to supply most of the crude, and the 300 wells on production in one individual month have already made more than 1,500,000 bbl. daily. A gas-reinjection program will start at Burgan when facilities are completed next year. One-hundred million cubic feet daily will be returned to formation.

A new discovery was brought in this year 21 miles west of Burgan, near the junction of the Kuwait, Neutral Zone, and Saudi Arabia borders. The 1 Minagish was completed at 10,030 ft., and tested 10,000 bbl. daily of 34.8°-gravity crude from Ratawi limestone. Another wildcat, at Dibdibba 25 miles northwest of Minagish, was abandoned at 9,438 ft. as a dry hole.

A new 4,000-bbl. Platformer has gone into operation at the country's 190,000-bbl. refinery. The unit will take care of local needs for high-octane gasoline.

KUWAIT REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Kuwait Oil Co., Ltd., Mina-al-Ahmadi	190,000	.....	.....	4,070 Pf	400 A[1]
American Independent Oil Co., Mena Abdulla	[2]30,000	.....	.....	.....	.....
Total	220,000	.....	.....	4,070	

(1) Adding 115-bbl. per day asphalt unit. (2) Processing Neutral Zone crude.

KUWAIT PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Burgan, 1938	3,500-4,800	224	.....	1,399,439	3,401,704,216	30-32
Magwa-Ahmadi, 1952	3,500-4,800	77	.....			
Minagish, 1959	9,000-10,000	(1)	.....	.....	.....	.....
Raudhatain, 1955	7,800-10,000	(2)	.....	.....	.....	.....
Sabriya, 1957	7,500-8,200	(3)	.....	.....	.....	.....
Total		301	.....	1,399,439	3,401,704,216	

(1) New discovery. (2) 25-well field not yet on production. Plans call for initial 125,000-bbl. output. (3) Two-well field not yet on production.

NEUTRAL ZONE—Japanese speed things up

THE JAPANESE FIRM drilling in Neutral Zone offshore waters plans to bring in a second platform to speed operations.

Arabian Oil Co., the first Japanese firm to explore in the Middle East, prepared to raise more money for its venture after its first well caught fire and caused a 4-month delay in drilling operations. The wildcat, 25 miles out in the Persian Gulf, burned for 9 days after hitting a shallow gas pocket at 1,500 ft.

The Japanese firm holds concession rights from both Saudi Arabia and Kuwait. Kuwait's onshore rights on the jointly held zone are being developed by American Independent Oil Co. Getty Oil Co. holds the onshore concession from Saudi Arabia. Production has averaged more than 110,000 bbl. daily this year. Aminoil is developing the 7,100-ft. Ratawi pay, while Getty Oil is concentrating on the shallower Eocene.

Each company operates its own refinery. Aminoil's 30,000-bbl. plant is located in Kuwait. Getty Oil's 50,000-bbl. plant is in the Neutral Zone itself.

NEUTRAL ZONE REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Getty Oil Co., Mina Saud	50,000	.....	.....	.....	.....
Total	[1]50,000	.....	.....	.....	

(1) Dual-purpose topping plant. Can be used as stabilizer for H_2S removal.

NEUTRAL ZONE PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Wafra field:						
Burgan, 1953	3,700	40	....	39,000	64,600,000	24
Eocene, 1954	1,200-2,200	37	30	40,000	18,000,000	17-19
Ratawi, 1955	7,100	15	....	34,000	16,800,000	25
Total		92	30	113,000	994,000,000	

QATAR—Picking up where it left off

SHELL CO. OF QATAR is picking up where it left off 3 years ago in its exploration program on an offshore concession in Qatar waters. The company has dispatched a new platform from the Netherlands, which will replace a mobile unit lost in an accident in December 1957 after drilling two dry holes.

Qatar Petroleum Co., an affiliate of Iraq Petroleum Co., has been drilling a deep test in Dukhan field. The projected 16,500-ft. well is searching for production zone deeper than any in the area. Known horizons of Dukhan have been fully developed with the most efficient rate of about 174,000 bbl. daily.

QATAR REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Qatar Petroleum Co., Ltd., Umm Said	600	.....	.....	.....	.....
Total	600	.....	.....	.....	

QATAR PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Dukhan, 1940	6,550	39	....	169,000	359,756,000	41.7
Total		39	....	169,000	359,756,000	

SAUDI ARABIA—Natural gas for sale

ARABIAN AMERICAN OIL CO. is rounding out the year with the opening of Saudi Arabia's sixth commercial oil field.

Initial output from Khursaniyah will be limited to 45,000 bbl. daily, to be taken out by an existing 22-in. crude line from Safaniya field to Ras Tanura terminal. But the additional production, combined with Safaniya, makes available 250,000 bbl. daily production from Saudi Arabia's young northern oil fields.

The company has served notice that it has natural

SAUDI ARABIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Arabian American Oil Co., Ras Tanura	189,000	.....	.....	26,000 T 15,500 Fhy	1,210 Alky, 15,000 Hyd, 1,015 Poly, 900 A
Total	189,000	.....	.....	41,500	

SAUDI ARABIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Abqaiq, 1941	6,800	52	.....	260,449	1,469,375,024	38
Abu Hadriya, 1940*	10,115	.....	.....	.....	9,579	36
Dammam, 1936	4,850	[1]25	.....	34,071	388,032,714	35
Fadhili, 1949*	9,850	.....	.....	.....	.....	38
Ghawar, 1948	7,125	84	.....	706,570	1,591,492,431	35
Khurais, 1957	5,200	(2)	.....	11	1,947	33
Khursaniyah, 1956	6,900	(3)	.....	.....	.....	31
Manifa, 1957	7,900	(4)	.....	.....	.....	27
Qatif, 1945	7,350	10	.....	15,466	101,049,277	35
Safaniya, 1951	5,560	[5]17	.....	57,173	44,725,638	27
Total		188	.....	1,073,740	3,594,686,610	

*Shut in. (1) Includes 3 gas wells. (2) New 6-well field, shut in. (3) New 4-well field, shut in. (4) New 2-well field, shut in. (5) Another 15 wells shut in.

gas for sale to anybody who can find use for it, especially potential industrial users within the country. A volume of 201 million cubic feet daily will be available in 1960, and 214 million cubic feet daily in 1961.

About 66% of the natural gas produced in conjunction with oil already is used in conservation programs or industrially. This share will increase to 75% in mid-1961 when a new miscible-phase displacement program opens in Ghawar field. About 37,000 bbl. daily of LPG will enrich gas reinjected into north dome of 'Ain Dar section of the giant field.

The world's first plant making refrigerated LPG available for tanker shipment is being built at Ras Tanura. A unit scheduled for completion in August 1960 will cool gas to minus 25° F. for loading on special tankers. Its capacity will be 4,000 bbl. daily.

Saudi Arabia has acquired a voting voice in the management of Aramco with the appointment of two Saudis to the board. They are Shaikh Hafiz Wahba, a Saudi diplomat who is now ambassador-at-large to the Arab world, and Shaikh Abdullah H. Tariki, director general of the country's petroleum and mineral affairs. Tariki also is a leader in Arab League oil affairs, and this year won approval by the league's department of petroleum affairs for an Arab-owned big-inch pipeline that would serve Arab oil producers with a system to the Mediterranean.

SOUTHERN ARABIA—Possibly commercial

A DISCOVERY of possible commercial value has been made in Abu Dhabi, one of the Trucial Coast shaikhdoms that ring the southern edge of the Arabian Peninsula.

An affiliate of Iraq Petroleum Co. tested 2 Murban at a reported rate of 2,000 bbl. daily. The well is relatively close to the Persian Gulf, 150 miles south of Qatar. The test was drilled on the same structure where a well flowed 1,500 bbl. daily 6 years ago. This was abandoned when the test failed to yield oil after mechanical trouble in the well.

The Murban find is the second for Abu Dhabi. The first is an offshore discovery called Umm Shaif, brought in far out in the Persian Gulf by Abu Dhabi Marine Areas, Ltd. British Petroleum has two-thirds interest, and Cie. Francaise des Petroles, one-third. Evaluation drilling is in progress. The first well tested 2,400 bbl. daily.

Cities Service has stopped drilling on its Dhofar concession after drilling 11 wells, including two noncommercial oil producers. But seismic work has been continued.

ADEN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
B. P. Refinery (Aden), Ltd., Aden	120,000	.....	.....	12,000 Pf	3,500 CH
Total	120,000	.....	.....	12,000	

SYRIA, LEBANON, AND JORDAN—Transit countries

SYRIA plans to revamp its products distribution system with a products pipeline system originating from a new government refinery at Homs. Bids will be opened in February for a total of 310 miles of 6-in. line to be built to Aleppo, Damascus, and Latakia.

Plans also are being considered for a 500-mile crude line from Karachuk field to the Mediterranean. The field was discovered 4 years ago by J. W. Men-Hall in northeastern Syria. But the concession was cancelled by United Arab Republic last year, at which time Atlantic Refining and Portsmouth Steel had entered the venture.

An alternative outlet would be a feeder line from Karachuk to a proposed big-inch Arab-owned pipeline from the Persian Gulf to the Mediterranean. The system would serve all Arab oil producers. The project has been endorsed by the Arab League's petroleum department.

Concordia, a subsidiary of the West German firm of Deutsche Erdol, has made a discovery at Suwaidiyah, but its importance is not yet known.

In Jordan, Phillips Petroleum obtained additional exploration acreage after five dry holes on the original concession. Lebanon will be explored by a West German company, Gewerkschaft Elwerath, which took up an option on a license held by Cie. Libanaise des Petroles.

All three countries are important as transit countries for pipelines to the Mediterranean from Iraq and Saudi Arabia. Lebanon this year ended long negotiations with Iraq Petroleum Co. with a new agreement for higher transit fees.

SYRIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Syrian Government, Homs	(1)				
Total					

(1) 20,000-bbl.-daily topping plant under construction.

LEBANON REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Iraq Petroleum Co., Ltd., Tripoli	11,550				
Mediterranean Refining Co., Beirut, Sidon	12,500			1,400 Pf	
Total	24,050			1,400	

JORDAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Jordan Oil Refinery Co., Zerqa	(1)				
Total					

(1) 6,400-bbl.-daily refinery under construction by Soc. Nazionale Metanodotti.

TURKEY—Refineries in the works

TWO NEW REFINERIES are definitely in the works for Turkey. A construction contract for a 65,000-bbl. plant at Mersin has been awarded to Foster Wheeler, with work to start this year. The $50,000,000 project is scheduled for completion late in 1961. Partners in the plant are Socony Mobil, with 37%; Caltex, 34%; Royal Dutch-Shell, 18%; and British Petroleum, 11%.

In a separate project, Caltex has reached an agreement with Turkish Petroleum Corp. for a 20,000-bbl. refinery near Izmit, in the Istanbul area. Caltex will own 49% and the government-controlled company 51%. An existing refinery at Batman, which runs on

TURKEY REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Shell, Cal-Tex, B.P., and Socony:					
Mersin	(1)				
Caltex-Turkpet, Izmit	(2)				
Turkiye Petrolleri, A. O., Batman	[3]6,950		3,060 TCC		1,442 V, 1,282 A
Total	6,950		3,060		

(1) 65,000-bbl.-daily refinery planned. (2) 20,000-bbl.-daily refinery planned. (3) Additional 6,950-bbl. crude unit planned, plus 5,200-bbl. unit for TCC feed preparation.

TURKEY PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Raman, 1945	4,400	.....	17	3,400	7,525,209	20.6
Garzan, 1950	4,750	.....	24	3,250	1,502,883	26.6
Germik, 1958	6,300	.....	1	90	19,100	20.5
Total		.....	42	6,740	9,047,192	

nearby crude production, is owned by the government, as is the crude output itself.

Hope is still good for discoveries by private companies. About a dozen firms are exploring in Turkey, and many have already drilled two or three wildcats. There are now about eight exploratory tests drilling. American Overseas Petroleum, a Caltex Group company, has made a small, 3,640-ft. discovery of 11°-gravity oil at Kahta. But it is not yet known whether the find is commercial. An affiliate of the West German firm of Deilmann Bergbau and Shell have pooled their concessions in European Turkey in a joint well.

ASIA-PACIFIC

AUSTRALIA—A look at the Great Artesian

A GROWING LIST of oil companies have decided to put up exploration money for a look at Australia's Great Artesian basin.

The vast sedimentary area covering a large part of eastern Australia has yet to have an oil discovery, and has seen little drilling. But commitments by new companies, most of which have teamed up with Australian firms already holding acreage, means that a large number of rigs will be moving into the country in the next few years.

Companies that joined the search this year include Union Oil Co. of California, Kern County Land Co., Texas American Oil Corp., Phillips Petroleum and Sunray Mid-Continent, Conorada Petroleum, General Exploration of California, Gulf Oil Corp., Murphy Corp., and Three States Natural Gas, of Dallas.

A Delhi-Taylor subsidiary has abandoned its first test in the basin, at Innamincka, after taking it to 12,580 ft. The rig will drill its next test at Betoota. The company is operator for itself, Santos, Ltd., and Frome Broken Hill, in which Stanvac and British Petroleum have part interest.

WAPET continues to explore in Western Australia, where it brought in the country's only discovery 6 years ago as a flash-in-the-pan find. Shell has joined the company, holding two-sevenths interest. California Standard and Texaco each hold another two-sevenths, while Ampol Exploration holds the remaining share.

The government is keenly interested in finding crude supplies at home. It is paying up to half the costs of some wildcats.

Australasian Petroleum is still testing a year-old discovery on Papua, Australian New Guinea. A wildcat 15 miles northwest of the Puri find was started late this year. The program is a joint venture of Stanvac, British Petroleum, and a local Australian company.

A $50,000,000 petrochemical complex is being built next to Stanvac's refinery at Altoona, near Melbourne. Four separate plants will produce polyethylene, polystyrene, and GRS-synthetic rubber.

New Zealand . . . Shell-BP Todd Petroleum Co. have a one-rig wildcatting program in progress at North Island. The second well was planned for the Gisborne area.

AUSTRALIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
B.P. Refinery (Kwinana), Ltd., Kwinana	70,000	.....	12,500 FCC	16,000 Pf	24,000 V, 5,600 CH, 500 A
Australian Oil Refining, Ltd., Kurnell	[1]45,000	.....	25,000 FCC	.....	24,000 V, 2,500 Poly
Bitumin & Oil Refineries, Ltd., Laverton	15,000	.....	.....	2,300 Pf	7,000 Un, 840 A
Shell Refining (Australia) Ptg., Ltd.:					
Clyde	20,000	.....	.....	6,700 Pf	.....
Geelong	46,000	.....	15,000 FCC	6,700 Pf	11,000 H
Standard-Vacuum Refining Co., Ltd., Altona	41,000	.....	23,500 TCC	5,500 Sf	1,400 V, 10,000 CH, 1,700 Alky, 670 L, 1,200 A
Total	167,000	.....	63,500	21,200	

(1) Adding 45,000-bbl. crude capacity plus 24,000-bbl. vacuum unit, 18,000-bbl. FCC unit, and 3,400 alkylation unit.

BRITISH BORNEO—Mainstay for Shell

SERIA FIELD in British Borneo continues to be one of the mainstays of Royal Dutch-Shell production with an output of more than 110,000 bbl. daily. This is supplemented by 400 bbl. daily from Jerudong, and 1,100 bbl. daily from Miri fields. A big mobile platform, "Orient Explorer," built initially for offshore work on the coast of British Borneo, has been transferred to Lake Maracaibo.

BRITISH BORNEO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Sarawak Shell Oilfields, Ltd., Miri-Lutong	46,000	.....	.....	.....	.....
Total	46,000	.....	.....	.....	

BRITISH BORNEO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Jerudong, 1955	3,523-4,021	2	...	193	333,859	40-55
Miri, 1911	300-6,270	...	176	1,081	73,310,029	21.5-47
Seria, 1929	834-8,994	125	188	110,275	465,580,447	19-50
Total		127	364	111,549	539,224,335	

BURMA—Slow start, picking up

AFTER a slow postwar start because of unsettled political conditions, Burmah Oil Co. (1954) now has an exploration program well under way.

Three dry holes have been drilled in the Irrawaddy Delta. The latest, at Payagon, was bottomed late this year at 13,108 ft. The fourth test in the area has been planned for Tharrawaddy District, northwest of Rangoon.

Three other deep tests have been drilled in central Burma. Two were at Ondwe, and another was Chauk 1,000, drilled in the old field that is the source of most of the country's oil.

BURMA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Burmah Oil Co. (Burmah Concessions), Ltd.:					
Chauk	4,400	.....	.....	.....	.....
Syriam	5,238	1,550 (Coker)		.....	35 C[1]
Total	9,638	1,550	.....	.....	

(1) Tons daily.

BURMA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Chauk-Lanywa, 1902	2,500			9,300)		
Others	.....	18	246	1,100)	305,400,000	36.0
		.....	.....			
Total		.....	.....	10,400	305,400,000	

FORMOSA—A promising find

CHINESE PETROLEUM CORP. made a promising find late this year when it deepened an old well in Chinsui field. The well flowed 65 bbl. daily of crude and 3.5 million cubic feet of gas daily from 11,726 ft. Crude production from established fields is less than 40 bbl. daily.

FORMOSA (TAIWAN) REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Chinese Petroleum Corp., Kaoshiung	28,000	4,000 Vis	10,000 TCC	2,500 Cat	2,000 V, 900 Alky, 700 A
Total	28,000	4,000	10,000	2,500	

FORMOSA (TAIWAN) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping*	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Chinshui, 1921	6,000-12,000	8	....	4	.....	44.0
Chuhuangking, 1904	3,000	1	21	23	.....	35.3
Chutonchi, 1940	4,000	4	3	7	.....	40.2
Chutung, 1934*	4,600	5	....	.....	.....	....
Niushan, 1930*	2,300	6	3	.....	.....	....
Shantzechiao, 1954	1,500	....	2	3	.....	18.9
Total		24	29	37	.....	

*Gas fields. (1) Cumulative figures not available.

INDIA—A major pipeline system

PIPE DELIVERIES are starting for a major pipeline system that will mean the start of commercial production from oil fields in Upper Assam.

The 720-mile crude line will open 55,000 bbl. daily of shut-in production from Nahorkatiya, and nearby Moran and Hugrijan licenses. A 260-mile 16-in. section will first be built to Noonmati, near Gauhati, where a 15,000-bbl. refinery is to be built by the Indian Government with Romanian help. A 460-mile, 14-in. section will extend to Barauni, where the government plans a 40,000-bbl. plant to be built with Russian aid.

The final link to Barauni is scheduled to be ready in 1962. The system and the producing fields will be owned by Oil India, Ltd., owned two-thirds by Burmah Oil Co. and one-third by India.

A government-sponsored drilling program in the Bombay region of western India has had encouraging shows of gas in several wells. The work is being carried on with the help of Romanian equipment and crews.

Private marketing companies have reduced prices on retail products for the second year in a row. But the reduction is credited directly to the government, and is not passed along to customers.

INDIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Assam Oil Co., Ltd., Digboi	9,286	1,715 (coker)	.....	.....	400 L, 135 C
Burmah-Shell Refineries, Ltd., Bombay	50,000	.....	12,000	6,700 Pf	
Caltex (India), Ltd., Visakhapatnam	15,000	.....	8,400 FCC	.....	7,500 V, 850 Poly
Standard-Vacuum Refining Co. of India, Bombay	38,000	.....	7,700 FCC	3,800 T	250 Poly, 750 A
India Refineries, Ltd.:					
Gauhati	(2)	.....	.....	.....	.....
Barauni	(3)	.....	.....	.....	.....
Total	112,286	1,715	28,100	10,500	

(1) Tons daily. (2) 15,000-bbl.-daily refinery under construction. (3) 40,000-bbl.-daily refinery planned.

INDIA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Digboi, 1890	....	36	540		.....	36
Nahorkatiya, 1953	....	13	....	9,000	.....	33
Moran, 1955	....	(2)	....		.....	....
Total		39	540	*9,000	65,970,000	

*Estimated. (1) 36 producers shut in awaiting pipeline. (2) 11 producers shut in awaiting pipeline.

INDONESIA—Reflects world demand

INDONESIA is an important crude exporter, and as such, its output is largely dependent on the needs of world markets, rather than on the limitations of its producing fields.

Caltex production from fields in central Sumatra varied all the way from 111,000 bbl. to 187,000 bbl. daily on a monthly basis during the year. Its output of 153,000 bbl. daily at midyear accounted for 44% of total Indonesian crude production. Most of the Caltex crude comes from Minas field.

Royal Dutch-Shell at midyear was producing 117,000 bbl. daily from 25 comparatively small fields, the biggest of which, Limau, in South Sumatra, was making better than 39,000 bbl. daily. Stanvac accounted for the remaining 80,000 bbl. daily from fields in central and south Sumatra. This company has fully developed its concessions, and for years has sought more exploration acreage from the government.

Shell has started a $50,000,000 development program at its last untapped oil field in Indonesian Borneo. The company is building a 161-mile 20-in. pipeline from Tandgung field to Balikpapan refinery. It will move 40,000 bbl. daily when it opens by early 1962. Throughput will be stepped up to 65,000 bbl. daily later.

Stanvac is developing a gas-bearing limestone formation in Radja field. The gas will be delivered via a 60-mile pipeline to a government fertilizer plant at Palembang.

Japanese business groups have continued to negotiate with the Indonesian Government for oil fields in North Sumatra that never were returned to Shell after the war. So far, the talks have never been concluded successfully.

INDONESIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
N.V. de Bataafsche Petroleum Mij.:					
Balik Papan	75,000	.....	.....	.....	.....
P. Brandan	(1)	.....	.....	.....	.....
Pladju	114,000	10,000	.....	15,000 T	.....
Tjepu	4,600	.....	.....	.....	.....
Wonokromo	3,200	.....	.....	.....	.....
N.V. Standard-Vacuum Pet. Mij., Sungei Gerong	77,000	27,000	20,000 FCC	.....	25,500 V, 800 Alky, 1,250 Poly
Total	273,800	37,000	20,000	15,000	

INDONESIA PRODUCTION
Kalimantan (Indonesian Borneo)

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Anggana-Muara, 1902	380-3,200	....	81	1,368	69,534,744	20.3-31.7
Balik Papan (Klandasan), 1903	740-765	....	....	.....	249,557	15.3
Bunju, 1930	2,020-7,850	41	....	10,610	16,872,827	22.5-32.8
Sambodja, 1910	160-4,400	....	48	844	57,659,542	23.3-31.1
Sanga Sanga, 1897	430-2,900	2	82	2,449	157,126,562	20.3-31.9
Sangatta, 1940	1,640-4,200	....	....	.....	1,150	36.0
Tandjung, 1938[1]	2,500-4,300	....	....	185	1,072,901	35.4
Tarakan, 1906	195-2,400	2	398	3,093	180,314,673	18.1
Total Kalimantan		45	609	18,549	482,831,956	

(1) 34-well field shut in awaiting pipeline.

Java

Kawengan, 1926	1,750-2,700	3	78	4,699	71,992,982	33.3
Kruka, 1929	970-1,600	....	51	479	9,358,320	28.0
Ledok, 1896*	320-3,200	....	....	.....	21,299,790	43.0
Lidah Kuldon, 1896	490-1,330	....	....	.....	33,369,000	24.5
Nglobo-Semanggi-Banjuasin, 1897*	370-3,350	....	....	.....	18,604,190	43.0
Total Java		3	129	5,178	154,624,282	

*Shut in.

Ceram

Bula Lemun, 1897	240-920	....	....	.....	8,203,000	23.0
Total Ceram		....	....	.....	8,203,000	

Sumatra (South)

Abab, 1951	6,000	4	....	534	1,626,562	35.0
Babat, 1901	100-1,050	1	13	39	8,479,474	32.3
Badjubang, 1927	2,700-3,300	7	24	1,739	34,847,059	46.6
Benakat, 1933	1,500	43	56	9,341	81,780,515	36.0
Betun, 1949	6,500	4	4	477	3,654,871	35.0
Betung, 1923*	180-950	....	....	.....	2,165,770	40.5
Djirak, 1930	900	6	74	2,957	41,580,813	37.0
Gunung Kemala, 1938	6,200-6,340	13	2	2,656	14,620,985	39.5
Karang Ringing, 1903*	160-2,200	....	....	.....	1,510,110	42.5
Kenali Asam, 1931	1,150-4,020	35	85	9,873	64,481,752	22.8-32.5
Kluang, 1914*	2,300-2,600	....	....	.....	28,704,430	40.0
Kruh, 1941	3,300	....	....	.....	1,474,979	38.0
Limau, 1928	4,450-5,350	62	25	42,412	56,427,921	29.8
Mangundjaja, 1935	660-2,200	....	41	1,317	17,145,470	23.5
Meruo Senami, 1938	2,400-2,650	3	....	79	345,472	46.2
Prabumlih West, 1953	4,740-5,640	6	4	2,449	6,485,693	33.0
Radja, 1940	6,500	18	1	2,701	12,762,101	40.0
Setiti, 1936	1,850-1,970	2	13	1,315	1,315,742	26.2
Suban Djerigi, 1905	1,300-2,500	1	18	594	37,000,211	48.7
Talang Akar-Pendopo, 1922	2,800	156	97	33,327	288,739,159	37.0
Talang Djimar, 1937	3,600-4,200	20	96	16,390	108,512,062	29.3
Tandjung Tiga, 1940	4,400-4,600	7	31	7,457	21,881,372	26.5

INDONESIA PRODUCTION (Continued)

Name of field—Discovery date—	(ft.)	No. of wells—Flowing	No. of wells—Pumping	Production in bbl.—Daily avg. 1st 6 mos.	Production in bbl.—Cumulative	Gravity °API
Tempino, 1931	1,930-2,700	11	93	8,598	65,949,671	41.5
Tg. Luntar, 1912*	2,200-2,800	....	....	....	4,312,090	56.0
Sei Taham, 1903	300-1,150	....	5	161	28,775,864	45.1
Selo, 1937	1,900	....	2	215	142,645	36.0
Deras, 1951	6,000	1	....	315	329,303	35.0
Others	....	....	....	....	111,674	....
Sungei Gelam, 1958	1,370-4,700	1	1	89	41,784	39.0
Keban, 1941	1,180-1,800	2	1	145	31,713	53.7
West Tandjung Mining, 1938	4,210-5,040	3	....	344	88,145	33.2
Total South Sumatra		406	686	145,524	935,245,312	

*Shut in. (1) Includes gas lift.

Sumatra (Central)

Bekasap, 1955	2,500	....	1	55	12,269	36.0
Duri, 1940	600	....	139	13,248	4,460,451	22.0
Kotobatak, 1952*	4,600	....	....	....	4,896	32.0
Lirik, 1939	1,600	....	14	2,918	801,305	34.0
Minas, 1944	2,400	45	102	139,261	222,687,412	36.0
Molek, 1956*	2,700	....	....	....	908	34.0
Pungut, 1951	2,800	....	....	5	48,140	38.0
Sago, 1940	1,800	1	52	25,305	14,528,859	34.0
Sebanga, 1940	1,000	....	....	....	2,369	32.0
Ukui-Pulai, 1940-1957	1,800	....	8	1,846	415,236	34.0
Total Central Sumatra		46	326	182,638	242,961,845	

*Shut in. (1) Includes gas lift.

North Sumatra[1]

Djrajeu, 1929	2,520-2,590	....	....	....	559,000	54.5
Gebang, 1936	2,970-3,400	....	....	....	135,000	54.0
Pangkalan Susu, 1927	1,550-2,100	....	....	....	6,287,000	56.0
Pace, 1939	2,520-2,590	....	....	....	559,000	34.5
Pulu Pandjang, 1928	1,640-2,400	....	....	....	11,243,000	55.5
Perlack, 1900	160-2,200	....	....	....	47,870,000	57.0
P. Tabuhan, 1937	3,300-3,500	....	....	....	3,283,000	52.5
Rantau, 1929	1,040-2,560	....	....	....	55,513,000	48.5
Seranga Djaja, 1926	3,560-4,150	....	....	....	7,551,000	64.5
Telaga Said D.K.G., 1893	210-720	....	....	....	23,621,000	51.5
Total North Sumatra		....	....	....	156,062,000	
Total Sumatra		452	1,012	328,162	1,334,269,157	
Total Indonesia		500	1,750	351,889	1,979,928,395	

(1) All formerly Royal Dutch-Shell fields. Some production now being made by Indonesian government company. No data available.

JAPAN—New projects planned

JAPAN already has one of the world's leading refining industries outside the U. S., and its capacity will grow further with new projects planned over the next several years.

Foreign companies have an important stake in some of the expansion programs through interests in local companies. Stanvac has 55% interest in Toa Nenryo. Caltex companies have half interest in Koa Oil and Nippon Petroleum. Royal Dutch-Shell has half interest in Showa, and Tidewater has 49% of Mitsubishi.

The Japanese are eager to develop their own crude production in the Middle East, and the Tokyo-controlled Arabian Oil Co. is drilling its first wildcat on an offshore concession in the Neutral Zone. At home, successful development wells in established fields have permitted at least modest gains in domestic crude production.

A 124-bbl.-daily well brought in this year west of Akita City in the Sea of Japan is the country's first offshore discovery.

JAPAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking—Thermal	Cracking—Catalytic	Reforming	Other processing
Daikyo Oil Co., Yokkaichi	55,000	.....	3,500 HD	3,000 Hf	12,000 V, 1,300 L
General Sekiyu, Kawasaki	(1)	.....	.....	.....	.....
Idemitsu Kosan:					
Tokuyama	80,000	.....	7,000 FCC	3,000 Pf	16,000 V, 3,000 Un
Kawasaki	(2)	.....	.....	.....	.....

JAPAN REFINING (Continued)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Koa Oil Co., Marifu	35,700	3,000	[3]	3,300 Pf	3,500 V
Maruzen Oil Co.:					
Chiba	[4]				
Shimotsu	37,500		[5]3,000 FCC		11,260 V, 1,750 L
Matsuyama	35,000	4,500 Vis		3,000 Pf	[6]
Mitsubishi Oil Co.:					
Kawasaki	51,620	3,000		4,500 Pf	12,500 Un, 2,400 V, 1,030 L
Mizushima	[7]				
New Asia Oil Co.:[8]					
Hokodate	12,000				
Yokohama	13,000				1,300 Un, 600 V
Nichimo Oil Refg. Co., Kawasaki	[9]				
Nippon Mining Co.:					
Funakawa	19,350				1,500 V, 1,100 L
Mizushima	[10]				
Nippon Oil Co.:					
Akita	4,000	1,000			2,193 V
Niigata	7,500			1,600 Pf	2,000 V
Kashiwazaki	1,500				
Nippon Pet. Refg. Co.:					
Yokohama	[11]46,000		6,300 FCC		8,000 V, 7,980 L, 3,300 Un
Kudamatsu	16,500			1,500 Pf	5,800 V, 1,160 L
Muroran	10,000				
Nippon Seiro, Tokuyama					1,100 V
Rekisei Koyu Co., Niigata					1,000 V
Showa Oil Co.:					
Kawasaki	27,000			1,500 Pf	5,800 V, 1,160 L
Hirasawa	3,000				1,000 V
Niigata	11,000				1,600 V
Showa Yokkaichi Oil Co., Yokkaichi	40,000		12,000 FCC		23,500 V
Toa Nenyro Kogyo Co.:					
Wakayama	57,000	3,770	10,200 FCC	4,700 Fhy	5,000 V, 3,500 L, 1,250 Alky
Shimizu	43,500				3,800 V, 660 L
Kawasaki	[12]				
Toa Oil Co., Kawasaki	12,000				
Taiyo Oil Co., Kameoka	22,000				
Total	640,170	15,270	42,000	26,100	

(1) 35,000-bbl. plant with 5,000-bbl. Powerformer to start operations in 1961. (2) 50,000-bbl. refinery to be completed mid-1964. (3) 5,000-bbl. FCC unit, 5,000-bbl. delayed coker due for completion mid-1960. (4) Planned 60,000-bbl. refinery. Construction due to start 1960. (5) 2,000-bbl. addition to FCC unit to be completed 1961. 6,000-bbl. Platformer to be completed 1961. (6) 4,000-bbl. Unifiner to be completed late 1960. (7) 40,000-bbl. refinery to be completed 1961. (8) Merger of Asia Oil Co. and Kita Nippon Sekiyu, effective Feb. 1960. (9) 15,000-bbl. refinery due on stream Jan. 1961. (10) Construction of 30,000-bbl. plant slated for Jan. 1962. (11) Construction of 30,000-bbl. refinery with 10,000-bbl. FCC unit to start 1963. (12) Construction of 30,000-bbl. refinery with 10,000-bbl. FCC unit to start, Jan. 1964.

JAPAN PRODUCTION

Hokkaido

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Barato, 1957	1,312	8		159	7,995	27.4
Ishikari, 1903	230-3,018		81	23	1,006,664	40.9
Soya, 1915	853-2,854		12	2	85,179	40.2
Others	525-2,296	3	1	20	784,879	28.4-40.9
Total Hokkaido		11	94	204	1,884,717	

Tohoku

Asahikawa, 1908	492-1,312		175	103	4,513,440	20.3
Fukura, 1957	2,624	2		270	67,573	45.3
Hachimori, 1938	656-1,476	2	25	49	598,261	17.1
Higashiyama, 1893	558-2,952		212	190	7,589,168	26.2
Innai, 1923	984-3,608	1	203	430	7,323,113	19.4-27.2
Kitakonoura, 1957	4,100		2	1	1,216	23.9
Mitsuke, 1958	5,904	2		330	22,631	38.9
Niitsu, 1896	164-4,920	1	438	422	18,050,319	18.4-29.3
Nishiyama, 1888	590-6,560	4	263	211	18,755,365	34.9-39.0
Sarukawa, 1958	2,034-4,264	2		151	8,611	34.9
Shonai, 1944	492-984	1	32	175	1,150,485	18.4
Tamugiyama, 1956	4,264	4	1	123	96,206	47.5
Yabase, 1933	328-5,642	199	323	5,052	23,121,002	32.9-37.9
Others	262-4,920	8	718	495	20,784,909	8.3-38.6
Total Tohoku		226	2,392	8,002	102,082,299	
Total Japan		237	2,486	8,206	103,967,016	

NETHERLANDS NEW GUINEA—Output is slipping

OUTPUT from three small fields slipped further this year to 4,400 bbl. daily. This level is a third of the peak achieved for a brief time 5 years ago. Royal Dutch-Shell, Stanvac, and Caltex are partners in the operation, which has steadily declined during the last half-decade.

NETHERLANDS NEW GUINEA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Klamono, 1936	300	....	24	4,217	18,189,165	18.8
Mogoi, 1940	1,250	....	13	229	4,231,640	42.8
Wasian, 1940	2,900-3,225	1	5	322	1,559,747	41.9
Total		1	42	4,768	23,980,552	

PAKISTAN—First find in 12 years

THE FIRST commercial oil discovery in a dozen years has been made in West Pakistan.

A Burmah Oil subsidiary, Pakistan Petroleum, completed 3 Karsal at 800 to 1,000 bbl. daily. Two earlier tests on the same structure were noncommercial. Because of the field's similarity with other producing structures in the general area, however, the potential of the field is believed limited to about 2,500 bbl. daily.

Pakistan Petroleum is only one of several companies participating in exploration programs in the country. Pakistan Oilfields has half interest in the Karsal venture. Tidewater Oil and Pakistan Petroleum are partners in a wildcat that late this year was drilling ahead at 11,700 ft. at Karachi.

Both Royal Dutch-Shell and Stanvac have continued to drill without success. Stanvac this year added a 3,200-sq.-mile block in northern East Pakistan, bordering India. The rights are in addition to a 10,000-sq.-mile block already held in that half of the country.

A four-company group will build a 30,000-bbl.-daily refinery in the Karachi vicinity by 1962. Caltex, Stanvac, Burmah Oil, and Shell will hold 60% interest. The remaining 40% will be sold locally in a private distribution.

Continental Carbon, Burmah Oil, and the government have agreed on a proposed 36-million-pound per year carbon-black plant, which will use gas from Sui field as feed. The possibility of using Sui gas as a source of exports of liquefied methane also is being studied.

PAKISTAN REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Attock Oil Co., Ltd., Rawalpindi	6,000	.....	.....	.....	.....
Shell-Burmah-Caltex-Stanvac, Karachi	(1)	.....	.....	.....	.....
Total	6,000	.....	.....	.....	

(1) 30,000-bbl.-daily refinery planned by four-company combine. Scheduled for 1962 completion.

PAKISTAN PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells	Production in bbl.		Gravity °API
			Daily avg. 1st 6 mos.	Cumulative	
Balkassar, 1946	8,200	7	2,744	11,523,000	21.3-26.0
Dhulian, 1957	7,600-9,200	8	2,693	10,460,000	36.3-45.1
Joya Mair, 1944	7,000	(*)	.....	1,453,000	19.0
Khaur, 1915	5,200	(*)	.....	3,550,000	36.9
Karsal, 1959	11,664	(1)	.....	.....	...
Total		.....	(2)5,600	26,986,000	

*Pakistan Oilfields, Ltd., subsidiary of Attock Oil Co., will not reveal individual field data. (1) Field discovery tested 800 to 1,000 bbl. daily. (2) Estimated.

PHILIPPINES—Local company makes good

THE PHILIPPINE ISLANDS appeared to have their first commercial discovery this year when two wells on Cebu Island came in as producers.

A local company, Republic Resources Development Corp., brought in the first Reina Regente well at 72 bbl. daily, and the second test, a short distance away, at 216 bbl. daily.

Most of the islands are under concession. But

other drilling has so far not yielded finds of commercial promise, including work by Stanvac in Luzon's Cagayan Valley.

Stanvac is building a 25,000-bbl. refinery on Bataan. Other projects are planned by Gulf Oil and Royal Dutch-Shell.

PHILIPPINES REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Caltex (Philippines), Inc.	22,000	.....	7,500 FCC	.....	950 Poly
Gulf-Philippine Investment, Luzon	(1)	.....	.....	.....	.....
Royal Dutch-Shell	(2)	.....	.....	.....	.....
Standard-Vacuum Oil Co., Bataan	(3)	.....	.....	.....	.....
Total	22,000	.....	7,500	.....	

(1) Planned 10,000-bbl.-daily refinery. (2) Planned 20,000-bbl. refinery. (3) 25,000-bbl. refinery under construction.

AFRICA

ALGERIA—France may cash in

FRANCE hopes to start cashing in next year on the oil it has worked so hard to develop in the Sahara.

A 415-mile 24-in. pipeline now going into operation from Hassi Messaoud field to Bougie, on the Mediterranean, is opening with an initial capacity of 80,000 bbl. daily. This will be stepped up to 280,000 bbl. daily by 1962. A second pipeline system of similar capacity will open in 1960. This 460-mile 24-in. line will carry crude from fields in the Edjele area of eastern Algeria to a terminal at Gabes, Tunisia.

The French Government hopes it will be able to find markets for 360,000 bbl. to 500,000 bbl. daily by 1962. It also wants to develop a production capacity in the Sahara of 1-million barrels daily by 1965.

The key to French plans is the giant Hassi Messaoud field, being developed by two French companies, S. N. Repal and CFP, each of which has separate productive areas. The companies have kept 15 rigs working and outposts are continually extending the known limits of the field. Recoverable reserves are conservatively estimated at 3.5 billion barrels.

Production from Edjele, Zarzaitine, and Tiguentourine fields in eastern Algeria is being developed by CREPS, in which Royal Dutch - Shell has 35% interest. Zarzaitine is the largest, with an estimated 600-million-barrel reserve. The per well yield from the group is small compared to Hassi Messaoud. But the oil is shallower and completion costs are much lower. Several other finds in the same vicinity have commercial possibilities.

Another big field may be in the making 50 miles south of Hassi Messaoud at El Gassi. A French company brought in the discovery at 2,540 bbl. daily, and the first stepout was successful. The third well showed up poorly, but drilling is continuing.

Jersey Standard joined the Algerian play this year when the French approved a 7,940-sq.-mile block along the Tunisian border to be explored jointly by

ALGERIA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Jersey Standard-CFP-Royal Dutch-Shell, etc., Algiers	(1)	.....	.....	.....	.....
Total	.....	.....	.....	.....	

(1) Seven-company combine plans 44,000-bbl.-daily refinery to go on stream in 1962.

ALGERIA (AND SAHARA) PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells: Flowing	No. of wells: Pumping	Production in bbl.: Daily avg. 1st 6 mos.	Production in bbl.: Cumulative	Gravity °API
Oued Gueterini, 1949	1,100-1,600	.....	15	46	2,538,141	39
Edjele, 1956	1,600-2,700	(1)	....	.....	.....	35
Hassi Messaoud, 1956	11,000	[2]38	....	18,454	6,291,433	44
Hassi R'mel, 1956	6,900-7,400	(3)	....	.....	.....	....
Tiguentourine, 1956	2,800	(4)	....	.....	.....	42
Zarzaitine, 1957	4,500	(5)	....	.....	.....	42
Eladeb Larache, 1958	2,700	(6)	....	.....	.....	....
El Agreb, 1959	11,600	(7)	....	.....	.....	....
El Gassi, 1959	11,600	(8)	....	.....	.....	....
Total Algeria (and Sahara)		.....	15	18,500	8,829,574	

(1) 62-well field shut in awaiting pipeline. (2) Production limited to capacity of small-diameter pipeline. (3) 8-well gas/condensate field shut in awaiting pipeline. (4) 8-well field shut in awaiting pipeline. (5) 26-well field shut in awaiting pipeline. (6) 1-well field discovery. (7) 1-well field discovery. (8) 3-well field.

Jersey and French companies. Jersey has half interest in the concession. CFP(A) has 35%, and Petropar, 15%.

Phillips Petroleum and two French partners, Omnirex and Copefa, have acquired more acreage southwest of Hassi Messaoud. The new Hassi Chaambi license covers 148,262 acres adjoining a previously awarded permit at El Morr. This raised the total acreage of the block to 469,492 acres. Phillips has 25% interest in the new permit; the French firms split 75%.

The French also are making plans to open Hassi R'Mel gas field in West Central Algeria. A construction contract has been awarded for a 327-mile 24-in. pipeline to the Mediterranean, which will serve local industries. Eventually, the gas may be exported to Europe, either in liquefied form or by pipeline. The field's probable reserves are estimated at 28 trillion cubic feet.

EAST AFRICA—Drilling, refining, and a freak

SUDAN has granted a 1.4-million-acre concession covering onshore and offshore areas along the Red Sea to General Exploration Co., of Los Angeles. The block adjoins a license of similar size granted to Italy's ENI, which agreed to split commercial production, if found, on a 75-25 basis favoring the government.

An offer to build a refinery that would cover Sudan's entire demand has been made by Royal Dutch-Shell and British Petroleum. The same two companies have reached an agreement with the Kenya Government for a refinery to be built at Mombasa.

Shell and BP are drilling a series of wells in the 2,500-ft. class in Kenya, and they are continuing a deep-drilling program on Zanzibar. A wildcatting program in Tanganyika has been suspended, but seismic work and stratigraphic drilling are still continuing.

In Somalia. Sinclair Somal and the ENI subsidiary, AGIP, each have one-rig drilling programs. Stanvac has had a one-rig program to the northeast in Somaliland Protectorate. A German company, Gewerkschaft Elwerath, in which Shell and Jersey Standard have an interest, has taken out a concession in Ethiopia that once was part of Sinclair's old license.

Plans are being made to utilize natural gas from Lake Kivu, in eastern Belgium Congo. Freak circumstances have trapped an estimated 2 trillion cubic feet of methane in a gas-bearing stratum on the bottom of the lake. The gas can be produced merely by sticking down a pipe from the surface of the water, and priming it with a little air.

EGYPT—New discoveries, new hope

NEW DISCOVERIES have given Egypt hope that it will be producing 110,000 bbl. daily in 3 years, enough to have 30,000 bbl. daily available for export.

The biggest find of the year was made at 4 Sidri, which came in at 5,000 bbl. daily. It was made on Sinai Peninsula near other producing fields of Cie. Orientale des Petroles d'Egypte, owned 51% by the government and 49% by International Egyptian, whose major stockholders are Petrofina and an ENI subsidiary, AGIP.

The government-owned General Petroleum Co. is developing finds at Ras Bakr and K'reim on the Egyptian mainland. At least nine producers have been drilled so far at Ras Bakr, the biggest of which tested 3,800 bbl. daily. The two fields are expected to make 20,000 bbl. daily when surface facilities are completed either this month or in January.

The United Arab Republic is efficiently moving a record volume of traffic through the Suez Canal, 3 years after nationalization. Properties of Anglo-Egyptian Oilfields that were sequestered at the time of the invasion have been returned to the owner. These include a refinery at Suez and several oil fields, either held singly, or jointly with Mobil Oil.

The First Arab Petroleum Congress held in Cairo earlier this year was considered a success by observers. The meeting covered technical subjects, and served as meeting ground where Arabs could discuss their aspirations for a bigger voice in Middle East petroleum affairs from now on.

EGYPT REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking: Thermal	Cracking: Catalytic	Reforming	Other processing
Anglo-Egyptian Oil Fields, Ltd., Suez	55,000			4,000 T	
Raffinerie de Petrol du Govt., Suez	[1]26,000	2,700		2,700 T	1,300 V, 500 Poly, 650 A
Societe Egyptienne pour la Raffinage et le Commerce du Petrole S.G.E. ("SERCOP"), Alexandria	[2]6,200			1,200 CR	
Total	87,200	2,700		7,900	

(1) Planned to expand to 30,000 bbl. daily. (2) Adding 22,000-bbl. crude capacity.

EGYPT PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Asl, 1948	2,870-3,870	5	3	2,954	28,029,236	22
Belayim, 1955	5,100-8,700	40	....	26,463	20,817,348	22-23
Feiran, 1949	6,800	3	....	313	771,335	26
Gemsa, 1908	400-2,000	....	....	.....	1,445,381	41
Hurghada, 1913	700-2,500	....	23	628	39,608,267	22-30
Ras Gharib, 1938	1,200-2,500	8	117	17,605	162,573,046	26
Ras Matarma, 1948	1,940-3,200	....	3	371	575,599	17-18
Abu Rudeis, 1956	8,500	4	....	8,762	5,217,659	22
Sudr, 1946	2,700-3,000	5	7	3,021	31,529,296	23-24
Ras Bakr, 1958*	2,800	7	....	.....	.....	....
K'reim, 1958*	2,300	4	....	.....	.....	....
Total Egypt		76	153	60,117	290,567,167	

*Shut in pending construction of flow lines.

LIBYA—World's hottest oil country

ONE BIG DISCOVERY in combination with a batch of smaller finds has made Libya the world's hottest oil country.

The big find was made by Esso Standard 100 miles south of the Gulf of Sirte and 200 miles south of Benghazi. The 1 Zelten was completed at 17,500 bbl. daily. The second well came in at 15,000 bbl. daily. The third test on the structure was dry in the Paleocene limestone productive in the first two wells, but hit a new, deeper pay that late this year was still being evaluated. Esso is already making preliminary surveys for a pipeline system to the Mediterranean.

Another find in eastern Libya has been made by Mobil Oil, which brought in El-Amal B-1 at 865 bbl. daily on Block 12. This lies east of Block 6, where Zelten is located. Amoseas, jointly owned by Texaco and California Standard, brought in a 3,650-bbl.-daily well at Beda on its Block 47, southwest of Block 6.

The success in eastern Libya sent companies scurrying for remaining open acreage along the Egyptian border. New concessions in this area have been won in recent months by British Petroleum and ENI.

Discoveries with commercial possibilities have been made in several places across western Libya. Oasis Oil, an Ohio Oil subsidiary which is operator for the Conorada group, has drilled four wells in the 400 to 800-bbl.-daily class on Block 32. It also has brought in a discovery, as yet untested, in Block 26 bordering Tunisia and Algeria.

Libyan American has a 1,200-bbl.-daily and a 900-bbl.-daily well on Block 17, west of Block 32. Shell has a 700-bbl.-daily well at Bir Tlacsin on Block 70, and Gulf has a 750-bbl.-daily find on Block 66.

Because production is for the most part shallow, relatively close to tidewater, and close to European markets, the industry now takes for granted that Libya will become a substantial producing country within a few years.

LIBYA PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells* Flowing	No. of wells* Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Bahi, 1959	6,100	1	....	.....	.....	40
Bir Tlacsin, 1959	8,976	1	....	.....	.....	44
Beda, 1959	5,107	2	....	.....	.....	36
Dahra, 1959	4,940	4	....	.....	.....	43
Em-Gayet, 1959	4,100	1	....	.....	.....	35
El Amal, 1959	11,290	1	....	.....	.....	35
Mabruk, 1959	5,700	1	....	.....	.....	40
Zahalin, 1959	9,228	1	....	.....	.....	39
Zelten, 1959	5,670-7,657	3	....	.....	.....	37
Total Libya		15	....	(*)	.....	

*All wells shut in for lack of outlet.

MOROCCO—Refinery site picked

SEREPT, a French company with large concession areas in Morocco, is the only firm actively drilling at present. Concessions also are held by the Conorada group and by Rimrock International, but work has not advanced to the drilling stage.

A site for a 25,000-bbl. refinery has been picked on the Atlantic Coast near Casablanca. The plant will be owned jointly by ENI and Moroccan capital. A French company, Soc. Cherifienne des Petroles, has the country's only crude production. It averages about 2,000 bbl. daily from a series of small shallow fields discovered in the last dozen years.

MOROCCO PRODUCTION

Name of field—Discovery date—	Depth (ft.)	No. of wells Flowing	No. of wells Pumping	Production in bbl. Daily avg. 1st 6 mos.	Production in bbl. Cumulative	Gravity °API
Ain Hamra, 1918	400	....	....	.....	93,772	36.5
Bou-Draa, 1936	2,800	....	....	.....	273,651	39.2

MOROCCO PRODUCTION (Continued)

Name of field—Discovery date—	(ft.)	No. of wells Flowing	No. of wells Pumping	Daily avg. Production in bbl. 1st 6 mos.	Cumulative	Gravity °API
Bled ed Defaa, 1952					63,825	
Mers-el-Kharez, 1951	4,300	6		42	589,560	36.7
Oued Mellah, 1949	1,900	11		58	437,740	28.5
Upper Bled Eddoum, 1952	3,950		9	175	718,887	39.0
Lower Bled Eddoum, 1952	4,300	7		153	827,971	37.0
Upper Bled Khatara, 1953	4,600		10	232	702,587	39.5
Lower Bled Khatara, 1954	5,200	3		23	153,036	40.0
Upper Sidi Fili, 1952	3,950		4	41	275,152	39.0
Lower Sidi Fili, 1950	4,500	12		69	1,061,807	36.7
Tisserand, 1948					10,120	
Lower Zrar, 1955	5,600	1		39	118,369	35.7
Upper Zrar, 1955	4,900		1	9	15,397	36.0
Oued Beth Baton, 1947	3,300	10		43	963,189	35.0
Haricha, 1957	2,700	12	1	1,101	380,598	40.5
Total		62	25	1,985	6,685,661	

MOROCCO REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Ste. Cherifienne des Petroles, Petitjean	2,100		1,800 TCC		
Total	2,100		1,800		

NIGERIA—On the map

NIGERIA definitely is on the map as an oil-producing country.

Shell-BP Development Co. is now producing 15,000 bbl. daily, and the 30,000-bbl.-daily level is expected to be reached by the end of 1960. A new tanker terminal is being built at the mouth of Bonny River, which will be fed by an extension of an existing pipeline system. This will be ready by mid-1960.

Production is from comparatively deep fields where the per well yield is seldom more than 1,000 bbl. daily. But the crude is sulfur free, and the country is about the same distance from Europe as Venezuela. Output could reach 90,000 bbl. daily in 6 years. A refinery project is under consideration.

Mobil Oil also has concession rights in the country, and has an exploration program in its early stages.

NIGERIA PRODUCTION

Name of field—Discovery date—	(ft.)	No. of wells Flowing	No. of wells Pumping	Daily avg. Production in bbl. 1st 6 mos.	Cumulative	Gravity °API
Afam, 1957	9,000-9,400	6		2,432	1,091,888	36-55
Akata, 1953	5,500-7,000			(*)		48.0
Bomu, 1958	7,100-7,500	8		749	290,530	32-38
Oloibiri, 1956	8,000-9,800	9		4,676	1,862,952	20-29
Soku, 1958	10,600-10,650			(*)	4,860	33.8
Ebubu, 1958	8,200-8,500	4		117	3,548	26-30
Total Nigeria		27		7,874	3,253,778	

*Shut in. (1) Field on production less than 30 days in first half.

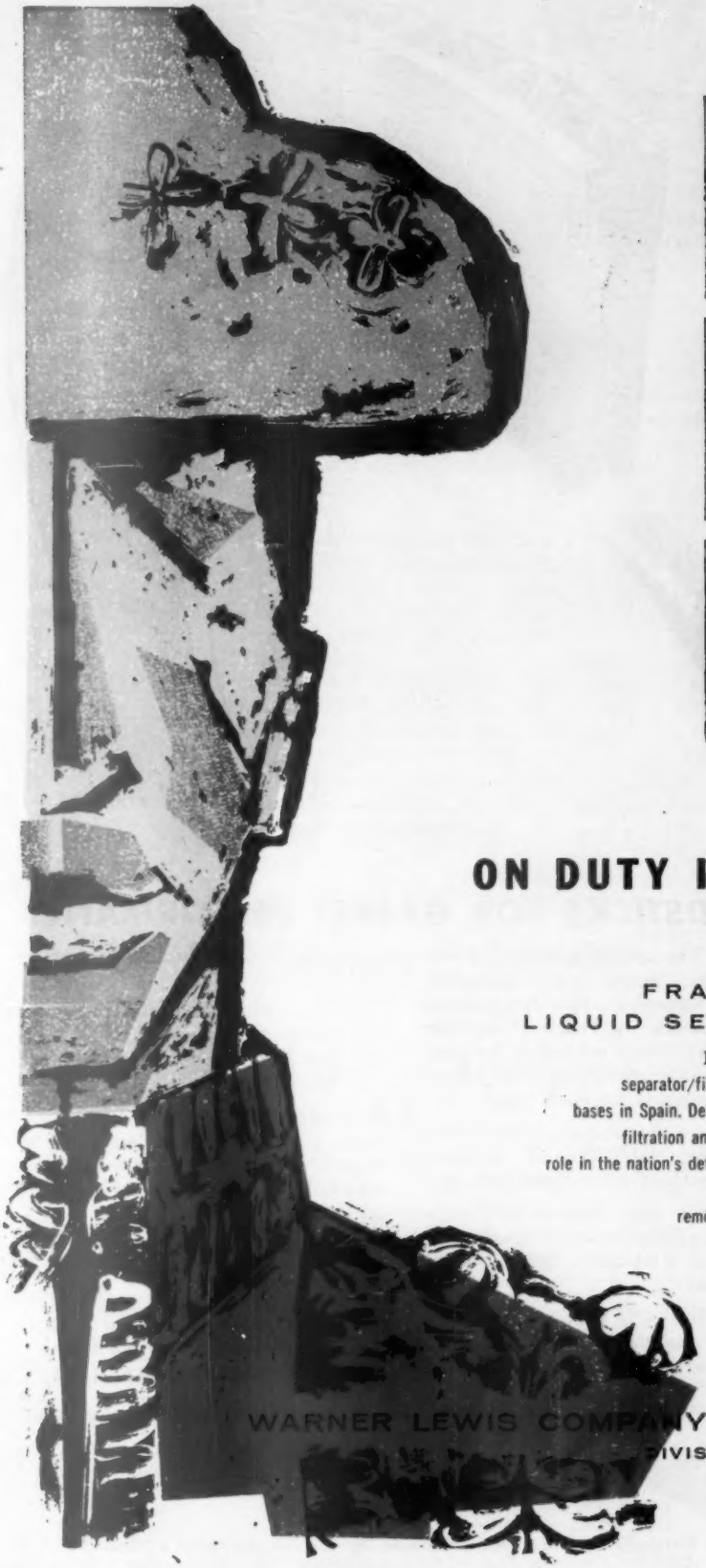
SOUTH AFRICA—First concession issued

ROYAL DUTCH-SHELL will spend about $68,000,000 for a 80,000-bbl. refinery near Durban. The plant will be the second in the country. The first is Stanvac's 21,000-bbl. plant at Durban, where an expansion is under way. The SASOL coal-to-oil plant at Coalbrook is expected to show a profit for the first time this year. The plant had been producing about 2,400 bbl. daily of all products.

Trans-American Mining Corp. acquired the first concession ever issued in the Union, in Namid Desert.

SOUTH AFRICA REFINING
(Barrels per calendar day)

Company—Refinery location—	Crude	Cracking Thermal	Cracking Catalytic	Reforming	Other processing
Standard-Vacuum Refining Co. of South Africa, Ltd., Durban	25,000		13,000 FCC	4,100 Pwr	5,700 Hyd, 425 Poly, 1,500 A
Total	25,000		13,000	4,100	



ON DUTY IN SPAIN

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SPANISH SAHARA—Due for a play

THE SPANISH Sahara is due for a major exploration play when Spain sorts out overlapping bids on promising areas and awards concessions in this brand-new territory.

Spain opened the African area for the first time this year, and most major companies made applications. The territory was divided into 108 blocks. Thirty-five of the zones are considered promising, and for these there were 162 applications.

A concession covering 328,000 acres in Spanish Guinea was awarded to Gulf Oil and a Spanish partner, CEPSA. The companies had entered the only bid on the territory, which was opened along with the Spanish Sahara and the Spanish mainland under a new oil law.

WEST AFRICA—Active exploration

A PETROFINA affiliate produces about 900 bbl. daily from small coastal fields in the Portuguese possession of Angola. Output is refined in a local topping plant, and consumed locally. Ten wells were scheduled for the final half of the year, three wildcat and seven development.

Two American and three French companies have formed partnerships for exploration concessions in Mauritania and Senegal, French West Africa. Continental Oil has 25%, and Cities Service 24% in 3.4 million acres in the Senegal operation. The remaining 51% is held by SAP and Coparex.

Rights over 7.3 million acres in Mauritania are held 24% by Continental, and 25% by Cities Service. Euraparet holds the remaining 51%. Ste. des Petroles du Senegal, in which British Petroleum holds half interest, already has a drilling program under way.

A 400,000-acre concession in Liberia has been obtained by American Liberian Exploration Corp., of Oklahoma City. The firm is to select another 1.1 million acres after further geological work.

A new discovery 45 miles from existing fields may give Gabon inland production for the first time.

The find was made at Rembo Kotto on acreage being explored jointly by Mobil Oil and a French company, SPAEF. The well tested 380 bbl. daily from 2,000 ft., and was being deepened in search of more productive horizons.

SPAEF has raised production in its coastal fields to more than 15,000 bbl. daily. It has reserved for itself acreage in this vicinity and in the region of discoveries in Middle Congo. But it has made joint agreements with Mobil over a large remaining part of Gabon and the Congo. SPAEF also has a joint venture agreement with Shell.

In the French Cameroons, another region of French Equatorial Africa, SPAEF continues to drill on a limited scale. No commercial discoveries have been made.

WEST AFRICA REFINING
(Barrels per stream day)

Company—Refinery location—	Crude	Cracking		Reforming	Other processing
		Thermal	Catalytic		
Companhia de Petroleos de Angola, Luanda, Angola	2,200				
Total	2,200				

WEST AFRICA PRODUCTION
Angola

Name of field—Discovery date—	Depth (ft.)	No. of wells		Production in bbl.		Gravity °API
		Flowing	Pumping	Daily avg. 1st 6 mos.	Cumulative	
Benfica, 1955	8,530	6		489	337,336	28.5
Lower Cacuaco, 1958	8,200	2		179	60,548	29.6
Galinda, 1959	7,054	1		(1)		30.0
Lower Luanda, 1957	5,580	4		264	244,941	30.2
Upper Luanda, 1957	2,130	1	2	4	8,202	30.4
Total Angola		14	2	936	651,027	

(1) Testing.

Gabon

Alewana, 1958	2,900	*1			40,243	
Animaba, 1957	1,600	5		310	76,750	13
Cap Lopez, 1958	5,700	9		2,420	508,179	31.6
Ozouri, 1956	2,000	9		2,000	1,969,673	22
Pointe Clairette, 1956	3,000-4,000	44		5,000	2,939,845	33
M'Bega, 1957	2,600	21		4,000	1,989,863	28
Total Gabon		89		13,730	7,524,653	

*Shut in.

Moyen Congo

Pointe Indienne, 1957*	4,400	7				36.5

*Shut in.

TEN-INCH TURBODRILL, French-made, is just being pulled from a Lacq well.

With Lacq, France gets into the export business

BY ANDREW E. CHUTE
Chief Process Engineer
Ralph M. Parsons Co.

When planned expansions to the gas-processing plant at Lacq are completed, daily production rates will be:

- 500 M.M.c.f.d. of dry, purified pipeline natural gas.
- Nearly 4,000 tons of sulfur.
- 240,000 gal. of highly aromatic high-octane gasoline.
- 300,000 gal. of LPG.

This will permit a reduction of about 10% in the country's imports of fuels, and will convert France from a sulfur-importing to a sulfur-exporting nation.

BEFORE the discovery of the natural-gas deposits at Lacq, one small field, Saint Marcet, had previously been found in France in 1939, and developed to yield approximately 35 M.M.c.f.d. This was France's only source of natural gas when Société National des Petroles d'Aquitaine made the great Lacq discovery. This company, commonly called SNPA, was organized in 1941 for exploration and development. It is controlled by the French Government through 54% stock ownership.

Late in 1949, at a depth of 2,130 ft., SNPA discovered an oil deposit close by the village of Lacq in southwestern France near the border of Spain. Production from this field initially ran at a rate of about 5,000 bbl. per day, but the field was quickly exhausted and production was halted less than 5 years after it began.

On the possibility that additional deposits lay under the initial discovery, deeper drilling was begun in 1951, and in December of that year the Lacq gas field was discovered when "Lacq 3" came in at 11,600 ft. with a tremendous eruption. SNPA had not only its richest discovery; it also found itself with a tiger by the tail. The well blew out—and it was quickly realized that this was no ordinary blowout.

Controlling the blowout . . . Some idea of the crisis facing SNPA can be understood when you consider these physical conditions and analysis of the escaping gas:

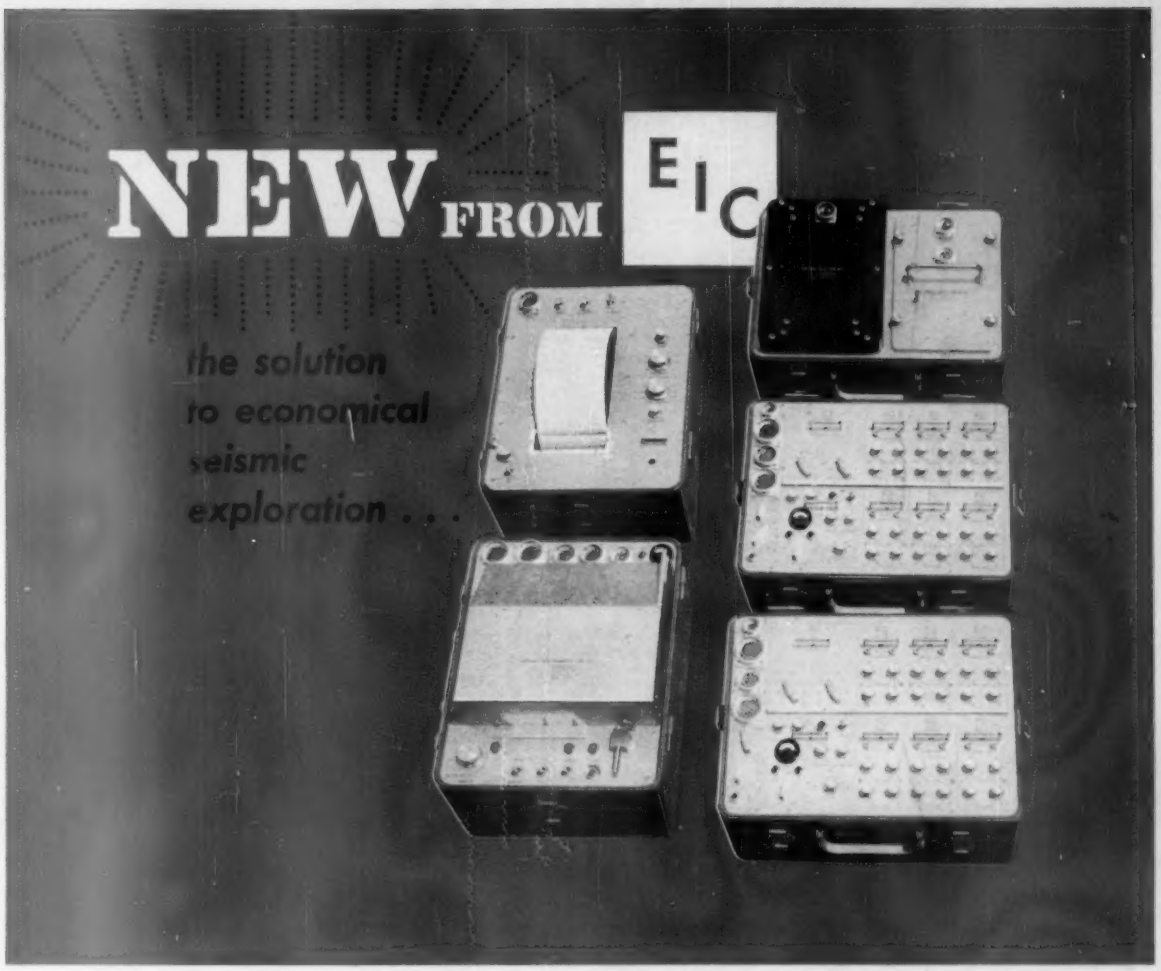
1. Pressure was nearly 10,000 psig.
2. Bottom-hole temperature measured 284° F.
3. Hydrogen sulfide content was 15% and carbon dioxide was 10%.

Any one of these conditions would in itself create its peculiar problems; SNPA found itself facing all of them in combination. Furthermore, the field was at a great depth. Comparison with some of the better-known natural-gas fields of the United States and Canada, Table 1, demonstrates the unfortunately unique character of the Lacq raw gas.

The immediate problem was the control of the blowout. The volume of escaping gas created a local crisis. Roads were blocked off; the rail line between Toulouse and Bayonne was closed to traffic; and a strict local prohibition was enforced against the use of fires.

Fortunately, the blowout did not catch fire before it was controlled. After 2 months of planning and preparation, the well was plugged with some 44,000 lb. of cement, and the

Presented at CNGA meeting, Los Angeles, 1959.



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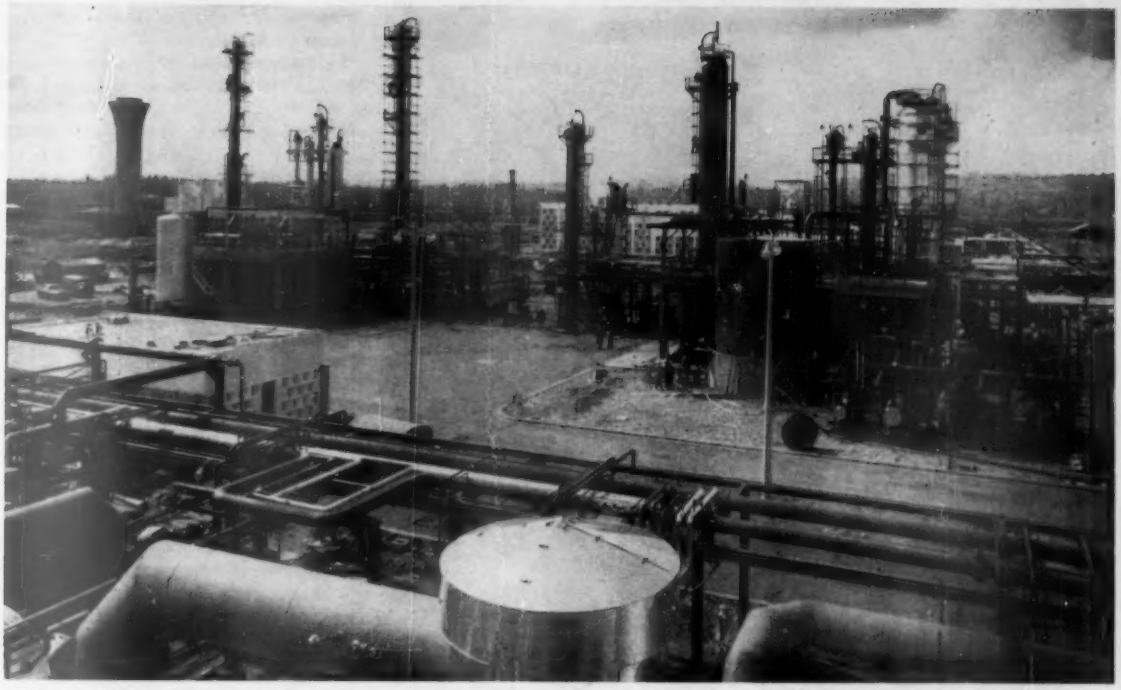

FIELD PROCESSING PLANT for Lacq, in southwestern France, includes two-stage sulfur-recovery unit, a natural-gasoline plant (at left), and a catalytic reforming unit.

TABLE 1—COMPARISON OF GAS-FIELD CHARACTERISTICS

	Lacq, France	Elk basin, U. S.	Pincher Creek, Canada	Calgary (Crossfield) Canada
Producing depth (feet)	10,800	4,900	12,500	8,600
Bottom-hole pressure (psig.)	9,500	1,500	4,950	3,600
Bottom-hole temperature (Avg., °F.)	280	122	180	170
Analysis:				
H_2H (%)	15.2	18.5	11.0	34.0
CO_2 (%)	9.6	6.0	6.0	10.1
Methane + Ethane (%)	72.5	57.2	77.4	51.5
C_3+ (Approx., g.p.m.	0.8	7.0	2.2	0.14

LACQ will eventually produce 1,200,000 tons of pure sulfur each year.

work of evaluating the discovery began.

By the end of 1956, seven wells had been drilled and the feasibility of full-scale development of the field had been thoroughly demonstrated. The most recent estimates place the Lacq gas reserves at approximately 8.8 trillion cubic feet, and over 70% of these reserves are considered recoverable. SNPA had made a discovery of major importance by any standards.

A master plan was established to develop Lacq in five phases. Each succeeding phase of its expansion has been larger than the preceding one, with Phases 4 and 5 each over four times the capacity of Phase 1. When completed, the facilities will process about 750 M.M.c.f.d. of raw gas, and will recover 4,000 long tons of sulfur per day, making this the largest installation of its kind in the world.

Gas processing . . . Raw gas in the field is produced at a pressure of 6,700 psi. at the wellhead, reduced to 3,130 psi. and 86° F. in the first stage, and then by a second-stage reducing valve to 1,400 psi., with the temperature maintained at 86° F. At this pressure, water is separated, and the gas transported to the gas plant. Methanol is injected to avoid hydrate formation on its way to the processing plant.

Actual processing of the Lacq gas

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for marketing falls into three basic unit processes:

1. Separation of hydrogen sulfide and carbon dioxide from the raw field gas.

2. Separation of propane, butane, natural gasoline, and residue oil from the partially purified gas.

3. Manufacture of sulfur from the hydrogen sulfide removed in Step 1.

The gas arrives at the input separator of the processing plant at a pressure of approximately 1,070 psi. and a temperature of 60° F. The separator gas goes directly to the desulfurization unit for acid-gas removal and the separator liquid to the gasoline-removal unit.

In the desulfurization unit of the Phase 1 facility, diethanolamine was selected for the removal of acid gases, primarily because of its proven performance. The amine is followed by a caustic wash to insure meeting the rigid pipeline specifications established. It was also felt that the caustic treatment would prevent any serious breakthrough of acid gas from the amine unit.

For Phase 2, monoethanolamine was selected rather than diethanolamine. The caustic wash, which had proved costly and troublesome due to foaming of the solutions and depositing of salts in the equipment, was omitted.

Another new development incorporated in Phase 2 was a water-wash unit preceding the MEA unit which permitted a considerable increase in the capacity of the desulfurization unit. This water wash was designed to remove part of the hydrogen sulfide and carbon dioxide, thus reducing the steam requirements and solution circulation per unit of gas treated.

Although power consumption is higher with this system, there is a net savings in utilities reported. The process was developed by SNPA in collaboration with a large French chemical company. Phases 3, 4, and 5 designs will incorporate improvements suggested from the actual performance of earlier facilities.

The gasoline and condensate-recovery system is integrated to some extent with the hydrogen sulfide-removal facilities because of the retrograde characteristics of the fluid at the separation pressures. The system, however, follows conventional designs.

TABLE 2—CHARACTERISTICS OF GAS DELIVERED FOR CONSUMPTION

Methane	95.30%
Ethane	3.45%
Propane +	1.35%
Heating value	1,040 B.t.u./cu. ft.
Hydrogen sulfide	Nil
Organic sulfur	0.13 to 0.30 Grains/100 cu. ft.

After treatment for acid-gas removal, the gas is dehydrated and absorbed in a low-temperature absorber using absorption oil made in the plant. This produces a final pipeline gas with the characteristics shown in Table 2.

The condensate from the high-pressure separator is flashed at 100 psi. and the gas from this flash is washed with amine for use as fuel. The remaining liquid is washed with caustic and fractionated to recover propane, butane, gasoline, and a light-oil residue. In later phases low-temperature fractionation will be used in which 50% of the ethane will be recovered for conversion into ethylene. This will produce a drier sales gas than delivered by Phase 1.

Sulfur facilities . . . Following the pattern of the other facilities at Lacq, the sulfur plants show an almost geometric progression in their capacity. The sulfur unit for Phase 1 was designed for the recovery of 228 metric tons per stream day; Phase 2 for 684 tons; Phase 3 for 1,000 tons; and Phases 4 and 5 for a combined total of 2,000 tons per day.

The sulfur-recovery process follows the Claus process, in which one-third of the hydrogen sulfide is oxidized to sulfur dioxide and then combined with the remaining two-thirds of the hydrogen sulfide, reacting to form elemental sulfur.

In the design of these plants, the key item of equipment is the reaction furnace in which the described reaction takes place. The equilibrium of the sulfur reaction is favorable for the production of sulfur at the high temperature obtained in the reaction or burning zone. As temperatures are reduced, this equilibrium becomes less favorable, passes through a minimum and then increases again toward the sulfur side at lower temperatures.

The kinetics of the reaction are rapid at high temperatures and relatively slow at the low temperatures. To exploit the favorable equilibrium plus rapid kinetics at high temperatures, a combustion chamber is provided, with residence time to allow the reaction to approach completion before the temperature is reduced. Rapid cooling of the gases to the dew point follows. At the lower temperatures, the rate is increased by the use of a bauxite catalyst.

For the reaction furnaces an adaptation of the standard Scotch Marine fire-tube boiler is predominantly used. For plants above 150 long tons per day, however, standard boilers are not easily adapted, and special designs must be used.

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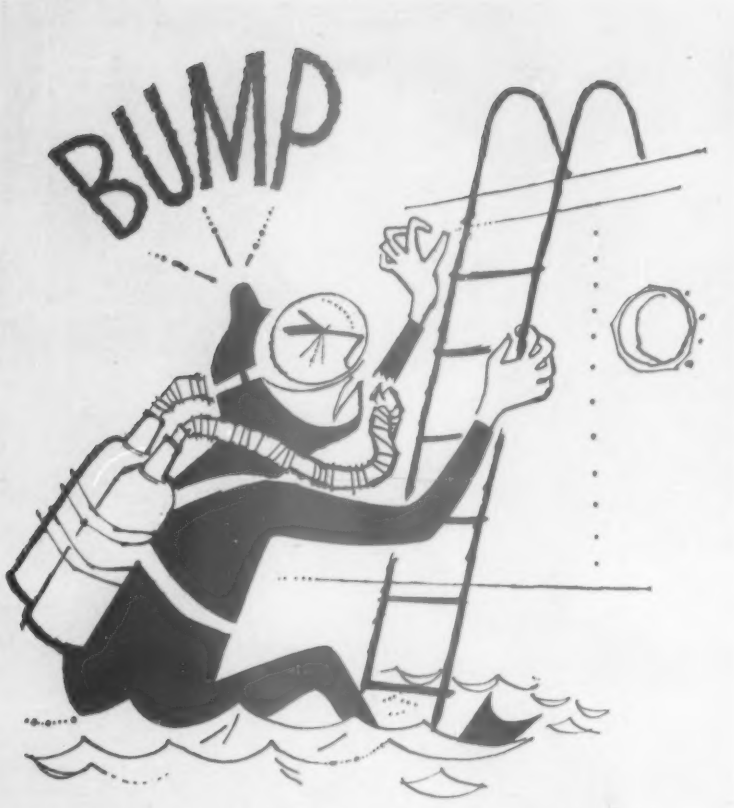

OF LOCATION

In the present work of reclamation in the Netherlands radio active sand had to be placed in cylindrical steel containers on the sea bed. During the operation one of the containers slipped its cable and sank. Later, when a diver was told it was to be recovered by reference to the Decca co-ordinates taken at the time of the mishap, his scepticism of the success of the operation was profound. However, the ship was brought into position and the frogman, mournfully anticipating a fruitless day plodding across the sea bottom dived overboard. Eye witnesses were astonished when he reappeared on the surface a few moments later and equally entertained by the force of his language as he expressed himself entirely satisfied with the accuracy of the Decca fix. He had, in fact, collided head on with the lost container!

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Phase 1 alone required almost twice the output of a single-fire-tube boiler, a new design was developed which was eventually patented in both the United States and Canada.

Horizontal converters are used to keep the vessel dimensions within shipping limits. They are equipped with rectangular catalyst beds and, due to their length, specially designed distributors are used to provide uniform flow across the catalyst bed.

The condensers for the sulfur-recovery units are vertical, fixed-tube-sheet heat exchangers, with hot gases inside the tubes, and either steam or boiler feedwater in the shell. The surface is tailored to fit the duties required. The tail gases from the last condenser pass through a coalescer to collect and recover entrained sulfur.

To safely dispose of tail gases, it is necessary to oxidize the unreacted hydrogen sulfide in an incinerator. Since even at high efficiency considerable sulfur dioxide will be discharged through the incinerator stack to the atmosphere, high stacks are needed to provide adequate dispersion of the waste gases. This is important, due to the growing industrial community in the area.

The stack for Phase 1 is made of carbon steel internally lined with cement in the lower part, and topped with a stainless-steel section to protect against the corrosive action of sulfur dioxide at 1,000° F. A self-supporting concrete stack, 328 ft. high, with an internal lining of firebrick was used for Phase 2. Phases 3, 4, and 5 will have similar stacks.

As might be expected from the size of these sulfur-production plants, the storage and handling facilities are extensive. The sulfur produced in the initial phases was "vatted" and accumulated in the conventional manner in blocks on concrete pads. From these solid blocks the sulfur was then removed by blasting, and loaded out with suitable material-handling equipment.

To improve upon this cumbersome method of handling, an entirely new technique was developed that has proved considerably more efficient. The technique is a simple one. The molten sulfur is sprayed onto concrete pads. As it is sprayed, it is partially cooled and condensed on the pads in loosely packed mounds which may be easily broken with bulldozers for loading by conventional power shovels.

Conveying and handling facilities are in place for producing and shipping sulfur in many forms—flakes, pellets, or powder—for shipment in bulk, bags, or other suitable containers to all parts of the world. The

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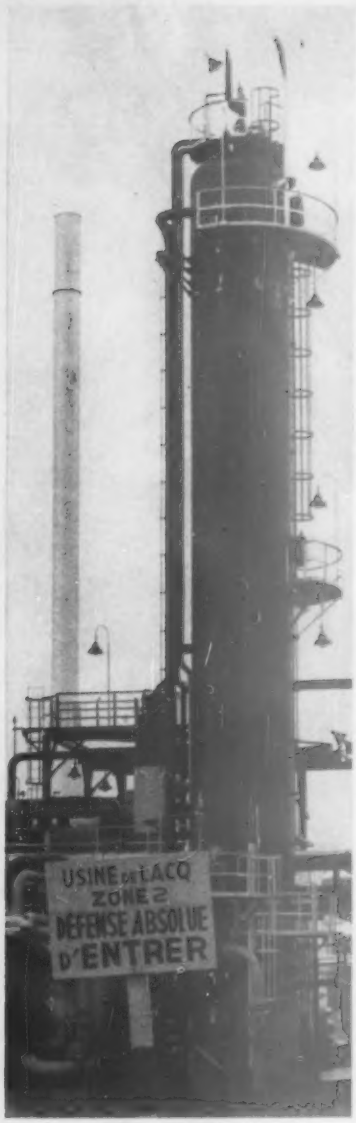

CLAUS-TYPE sulfur-recovery unit at Lacq. (Courtesy of Societe Nationale des Petroles d'Aquitaine).

sulfur produced daily would fill a train of 100 cars.

The storage of liquid-hydrocarbon products presented no unusual problems and the facilities follow conventional design. Propane is stored in bullets, butane in spheres, and the gasoline and heavy oil in atmospheric tanks. Shipment is made by tank cars and trucks.

Pipeline operations . . . To distribute the planned daily production of about 500 M.M.c.f. of purified natural gas, over 1,000 miles of pipeline are under construction. A 550-mile, 16 to 24-in. line to Paris is scheduled for completion late this year, while 12 to 16-in. lines to Lyons and Nantes constitute the major laterals. Some consideration is currently being given to the feasibility of piping gas into Switzerland.

With the tremendous investment for development of the gas field at Lacq, it is absolutely essential that the whole installation produce gas at the maximum possible steady rate, to reduce the fixed charges per unit of gas. Since the demand for the gas inevitably rises and falls with the hours and the seasons, tremendous storage reservoirs are needed to absorb the flow of gas when the demand is down and give it up when demand is at a peak.

France, unfortunately, cannot solve this problem as the U. S. does—by storing gas in depleted oil and gas fields—since suitable depleted fields are not available. SNPA set out to look for other underground structures that could be used and finally found what they wanted at Lussagnet, about 35 miles from Lacq in the direction of Paris. The structure is a gas-permeable body about 150 ft. thick lying 1,600 ft. below the ground surface. The boundaries are watertight.

Work was started in 1957, and more than a score of wells have now been completed for injection and withdrawal of the gas, and for exploring and recording the behavior of the reservoir.

A 24-in. line runs between Lussagnet and the gas-treating plant at Lacq. Gas could be injected at the rate of over 50 M.M.c.f.d. or withdrawn at the rate of 35 M.M.c.f.d. at the beginning of this year. It is planned to increase these capacities to 160 M.M. c.f.d. by 1961.

The location of the Lussagnet reservoir, relatively close to Lacq, has advantages, since the reservoir can supply gas to the pipelines if the gas-treating plant is offstream for any reason or if the plant production capacity is unequal to a peak demand. On the other hand, if there is trouble on the pipeline or the demand is low, production can continue at a high rate with the gas going into the storage reservoir.

The Lussagnet structure has been reported to have a capacity of 18 billion cubic feet, but studies have been made to increase this. Other underground storage sites have been found nearer to the large consuming areas. One of these is at Vernon, 50 miles north of Paris and could hold about 35 billion cubic feet of dry gas in two porous strata. The Vernon formation is being considered for use in 1960 or 1961 when the gas from Lacq will be in the Paris area.

Effect on France . . . Any discussion of Lacq and its facilities must take into account the tremendous impact of this rich addition to the resources of France. Primary products will have a value of about $100,000,000 a year. The total investment in wells, the gathering system, and the principal processing plants will be about $250,-000,000.

By 1962, Lacq will extract from the raw gas about 1,400,000 tons of sulfur per year. Even with the most optimistic projected domestic usage, France will have a considerable surplus available for export. This will lift France to about the level of Mexico in the world sulfur marketplace. With a freight advantage of approximately $3 per ton over Mexican and American exports to European markets, this exportable surplus will be readily salable.

Like most retrograde reservoirs, the Lacq gas is not especially rich in liquid hydrocarbons. Nevertheless, the scale of operations will be large enough to yield about 300,000 gal. per day of LPG and 240,000 gal. of highly aromatic, high-octane natural gasoline per day.

The principal economic values to be derived from the exploitation of the Lacq field will of course be found in the output of purified natural gas. In calorific value, the natural-gas production by 1962 will be equivalent to about 6,000,000 tons of coal—or 1 billion gallons of fuel oil. To any country this would be an economic blessing; to the energy-poor French, it is a bonanza. Lacq gas will permit a reduction of about 10% in the country's present imports of fuels, and provide between 3 and 4% of the nation's entire energy requirements.

Initially—and until the planned pipeline network is completed—the output will be used in Southwest France, the areas adjacent to Lacq. Existing fertilizer plants will be expanded, and the growing chemical industry will receive a substantial assist in the production of such products as ammonia, methanol, acetylene, acetyldehyde, butanol, and other organic chemicals.

Availability of other hydrocarbons will provide the building blocks for organic synthesis. A plant for the manufacture of ethylene is being built, and the manufacture of plastics will follow.

With abundant fuel at hand, a 125,000-kw. electric power plant is presently under construction, and with cheap power, aluminum producers in the area will place a new electrolysis plant of 50 to 60,000 tons per year in operation shortly.

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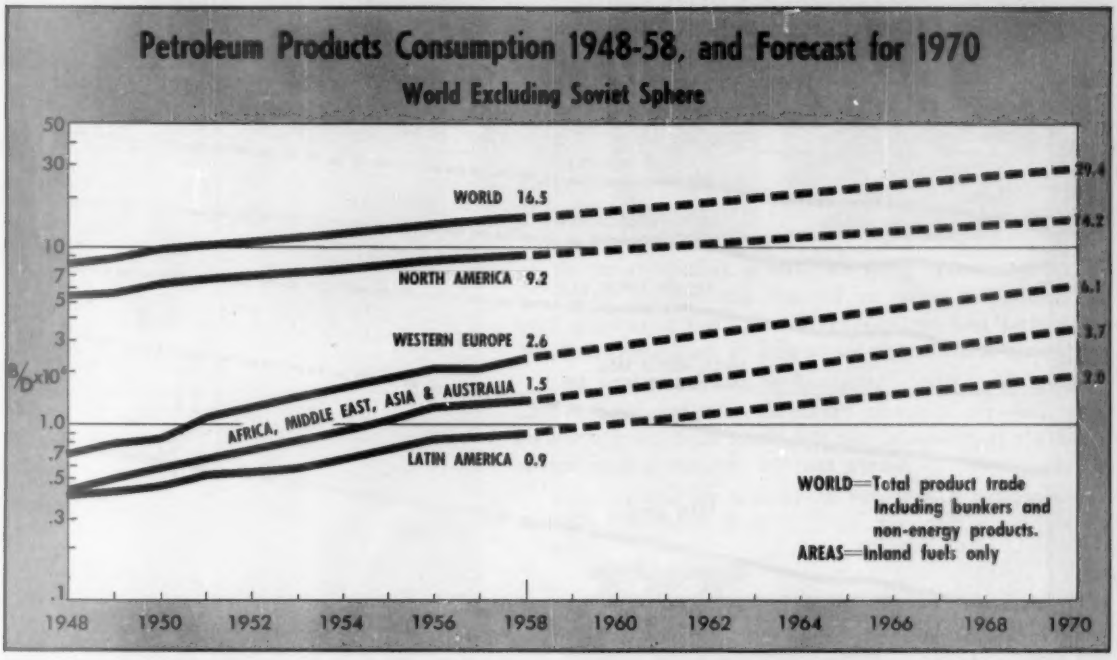
1960–1970


Petroleum Products Consumption 1948-58, and Forecast for 1970
World Excluding Soviet Sphere
WORLD 16.5
NORTH AMERICA 9.2
WESTERN EUROPE 2.6
AFRICA, MIDDLE EAST, ASIA & AUSTRALIA 1.5
LATIN AMERICA 0.9
B/D x10⁶
WORLD=Total product trade including bunkers and non-energy products.
AREAS=Inland fuels only
1948 1950 1952 1954 1956 1958 1960 1962 1964 1966 1968 1970

OIL'S NEXT 10 YEARS

In this study the authors, with Shell International Petroleum Co., Ltd., make some interesting long-range forecasts. For one thing, they foresee a demand for nearly 30,000,000 bbl. a day by 1970, implying an annual increase of 5%.

Say the authors:

"Don't Read Us Too Precisely"

A 10-year forecast is tough, at best. With oil, it's doubly difficult because, in addition to considering the rate of economic growth and energy demand, the economist also must consider the relative strength of the various primary energy sources competing for the market.

However, a 10-year period is not so long that the errors in a forecaster's assumptions will be multiplied out of all sense and value, even though it is too long for him to rely on help from known investment plans. We would consider as reasonable an error of 5 to 7%, either way, on a single estimate for 1970.

So, we have used single figures, rather than a spread, to avoid such wearisome phrases as "may possibly be" and "is likely to." But we ask the reader not to read more precision into our estimates than they will bear.

One thing to note: When we say "world" we mean except for the Soviet sphere, and the expression "the world excluding North America" likewise excludes the Soviet sphere.

THE NEXT 10 years present a paradox.

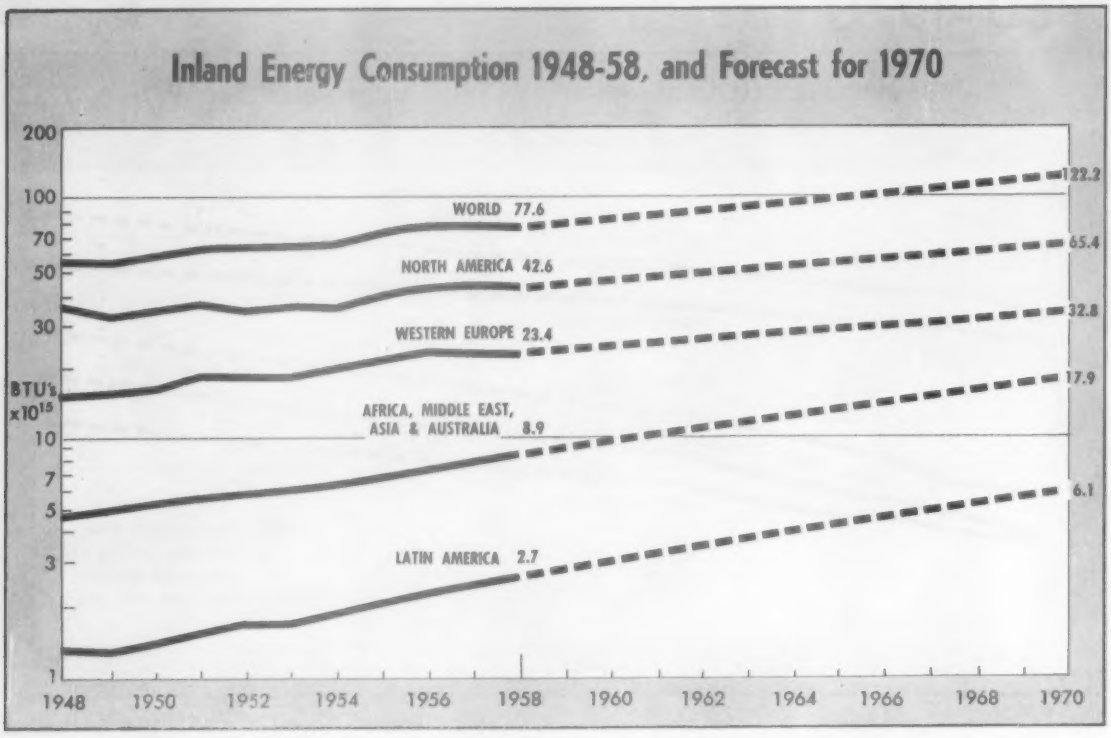
The free world will rely on oil, more than any other energy source, to provide the additional amounts of energy it will need.

Yet, competition, both inside and outside the oil industry, will become more intense.

A fundamental change occurred a year or two ago. Before then energy supply had always seemed a pace behind energy demand as many countries made giant strides toward economic recovery after the war. Now supply is ahead of demand and may stay there for some time.

Oil: The Next Ten Years

Our estimate is that nearly 30 million barrels per day of oil products will be consumed in 1970, 1.8 times



as much as it consumed in 1958. This implies an average annual increase of nearly 5%; i.e. that consumption will not grow as fast as it has since the war, but faster than it did between the wars. To explain why requires some examination of the underlying forces of economic growth, of the relationship between this growth and demand for energy, and of the strength of demand for oil as against other sources of energy.

Economic Growth

Growth will depend on the strength of such forces as population, technological advance and education, and the stock of capital.

Population. Recent demographic research by the United Nations suggests that world population is likely to grow faster in the period 1950-75 than it did from 1925-50. The following rates are derived:

TABLE 1 — ESTIMATED GROWTH IN WORLD POPULATION 1950-75

	Annual avg. inc., %
North America	1.44
Latin America	2.50
Africa	1.69
Asia	1.74
Europe	0.70
World ex N. America	1.64

Based on "The Future Growth of World Population" UN 1958.

In some areas, the dependent population is rising faster than the average, so that in the next few years the rise in the labor force may be below the total population rise.

Technology. Technological advance is more elusive. Dark horses are difficult to spot and in this field there are many. No one could have foreseen before the war the subsequent progress in, say, electronics or petrochemicals. It was Rutherford himself who is supposed to have told a lady, when she asked him if it would ever be possible to split the atom, that she had been reading too much Jules Verne.

Capital. One thing is certain. An increase in productivity depends on capital—to train the mind as well as assist the hand in the better utilization of scarce resources. And of all scarce resources, the scarcest is capital itself. Most of the capital is generated in developed areas and most is in fact spent there. The migration of capital to less-developed areas is, however, growing as Table 2 shows.

The recent strong growth of private foreign investment in these areas is encouraging; there is a growing realization in many less-developed areas of the important role which private risk capital can play if it is encouraged by fair treatment and the will to maintain a stable economy. Europe is likely to play a larger role in bilateral aid than heretofore. Multilateral aid should be strengthened by the increased capital structure of the World Bank, and by the new "soft loan" International Development Association. The rate of capital availability in less-

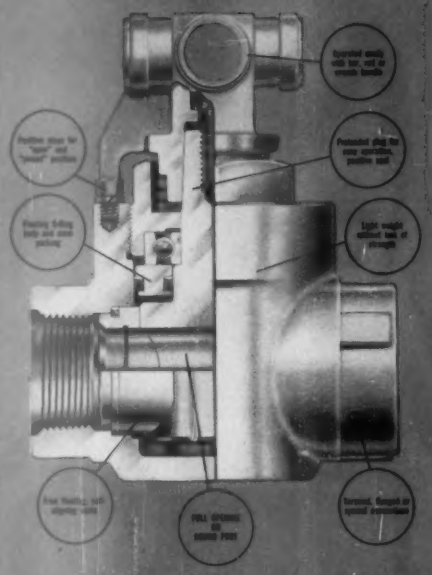
TABLE 2—PRIVATE AND PUBLIC FLOW OF CAPITAL TO LESS-DEVELOPED AREAS*

	Millions U. S. Dollars			
	1954	1955	1956	1957
a. Private Net long-term capital	678	641	1,248	1,946
b. Multilateral	155	155	224	340
Bilateral	1,814	1,814	2,196	2,513
Total Public (Economic Aid† (net))	1,969	1,969	2,420	2,853

Sources: a. ECOSOC "International Flow of Private Capital": refers to calendar years. b. U. N. Yearbook and "World Investment Convention?" (for 1957) refers to fiscal years.

*All countries in Africa, Latin America, and Asia, except Japan and South Africa. †1954 and 1955 are averaged from a 3-year total 1953-55.

GRAHAM...



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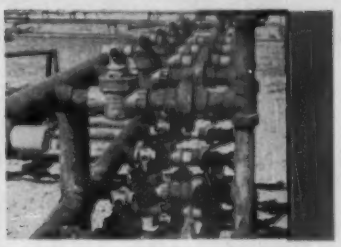

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developed areas should therefore be capable of acceleration.

Economic growth will also depend on the degree to which nations realize that war has become an anachronism and cannot help to solve the problems of the international division of wealth and on the degree to which they apply skill and foresight in international economic affairs. Improvement can be described in both these directions.

Area Growth Rates

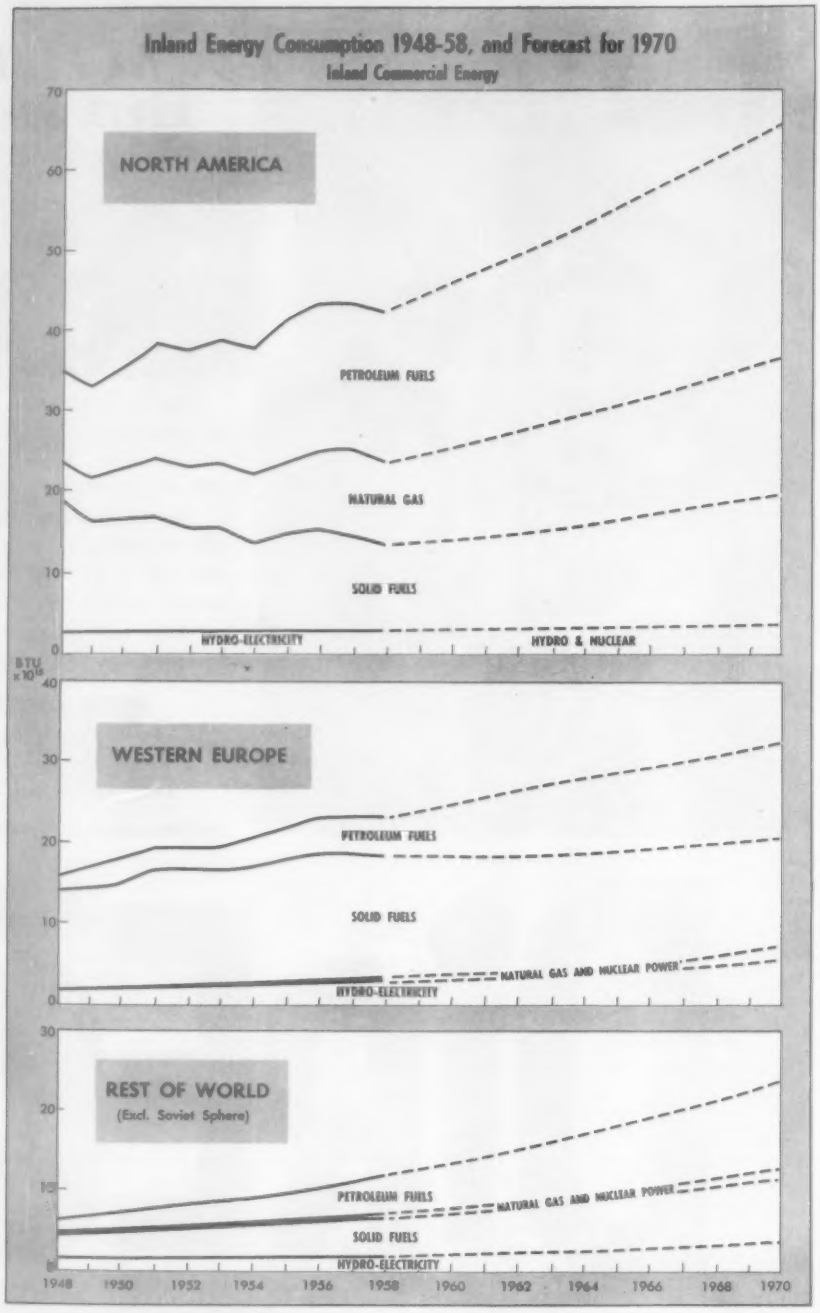
The over-all prospect is thus one of continued expansion. It is also reasonable to presume that economic fluctuations will not be severe. Our principal assumptions are as follows. In North America the postwar trend of economic growth can be expected to continue in the U.S.A. This implies an increase in gross national product (GNP of about 3.6% per annum. In western Europe a slower trend, 3-3½% of GNP p.a., can be expected after the strong growth of the postwar period (5-5½% a year, GNP 1948-56).

Most observers discount measurable additional economic gains from the union in the six Common Market countries within the next 10 years. In many of the primary producing areas, lack of foreign exchange and in some places, political instability will tend to retard growth, but these are not new phenomena and their effects should not be exaggerated. In Latin America, where both are present, the trend in growth of total gross product may only fall from about 4½% a year to 4%.

Africa is also likely to experience some deceleration, but this may be principally due to a somewhat slower growth in South Africa which weights the continental average heavily. In Asia and Australia the growth rate of recent years (disregarding abnormal postwar acceleration) may in general be sustained.

Relationship Between Economic Growth and Energy Growth

A paper[1] at the 1959 World Petroleum Congress noted that "A general relationship between energy consumption and economic growth has both logical and empirical support. But it is discouragingly difficult to come up with a meaningful measure of the energy coefficient." In underdeveloped countries important developments in energy-consuming projects may still be too marginal to the growth of the whole economy for the relationship to be significant. In developed areas the coefficient has been found volatile in the short term and the longer term forces of efficiency and intensity

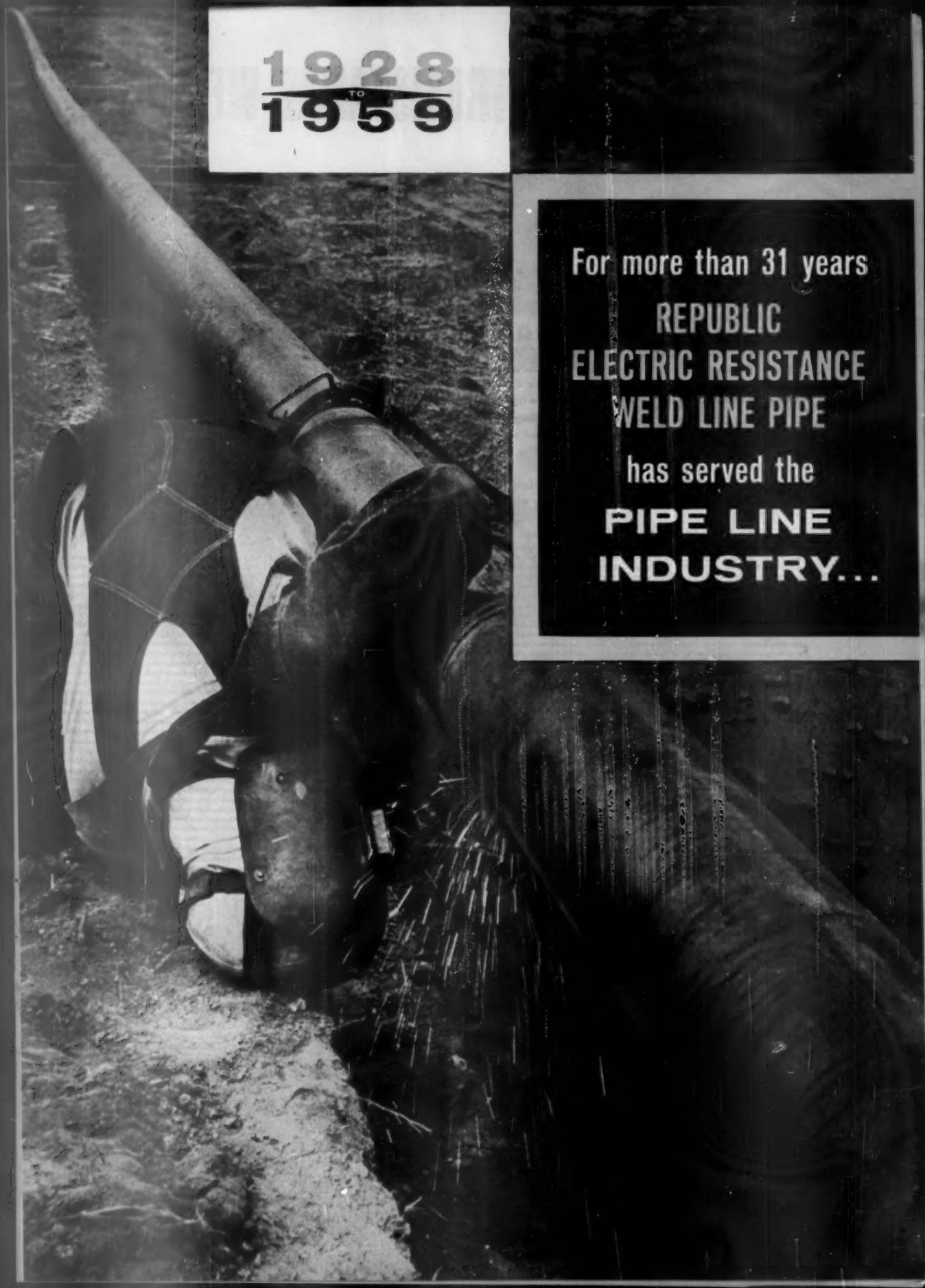


THE PATTERN OF DEMAND

IN NORTH AMERICA the estimates show a fairly stable pattern between the primary energy sources. Petroleum fuels, which became the major contributor in 1952, will show the largest volumetric increase over the next 10 years.

IN WESTERN EUROPE petroleum by 1970 may be supplying 35% and solid fuels just over 40% of the total energy market. Compared with 1958 this represents a gain of some 12% of the market to petroleum fuels and a loss of over 20% by solid fuels. The share of hydroelectricity is unlikely to change significantly. The remainder of coal's loss will be taken up by natural gas and atomic energy, but these will remain small contributors during the period.

IN THE REST OF THE WORLD, the changes in the pattern will follow the same course as in Europe but they will be less marked. Petroleum fuels may be approximately 50% of the total energy market by 1970, compared with 40% in 1958, while solid fuels may drop below 35%.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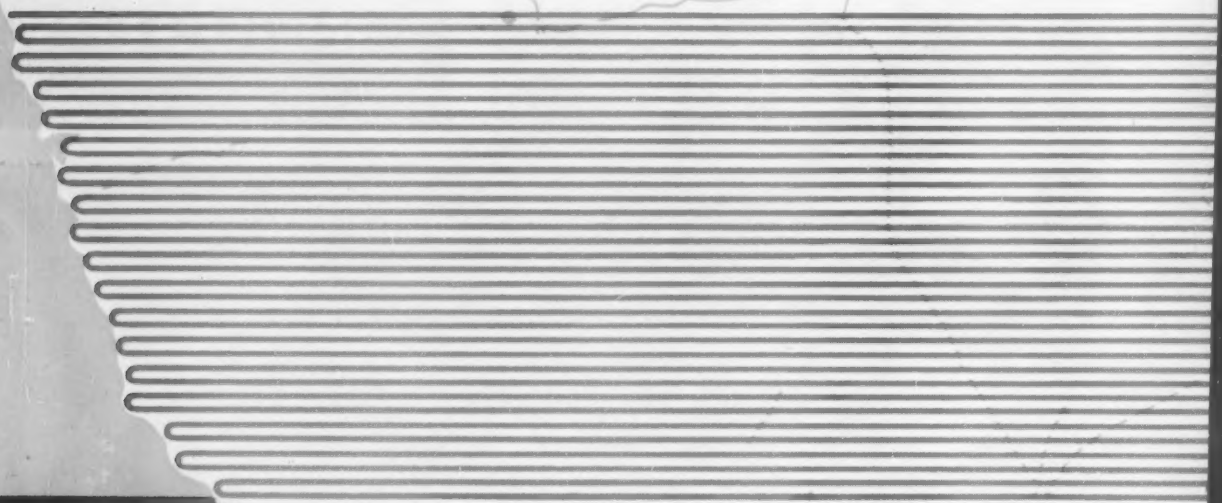

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AMERICA'S MAJOR PRODUCT PIPE LINES are indicated in the map above. Many of these and other installations are Republic Electric Resistance Weld Line Pipe. The lengths of pipe, traversing the map, symbolize total pipe produced since 1928 —averaging more than one span of the continent for every year since Republic Electric Resistance Weld was introduced.

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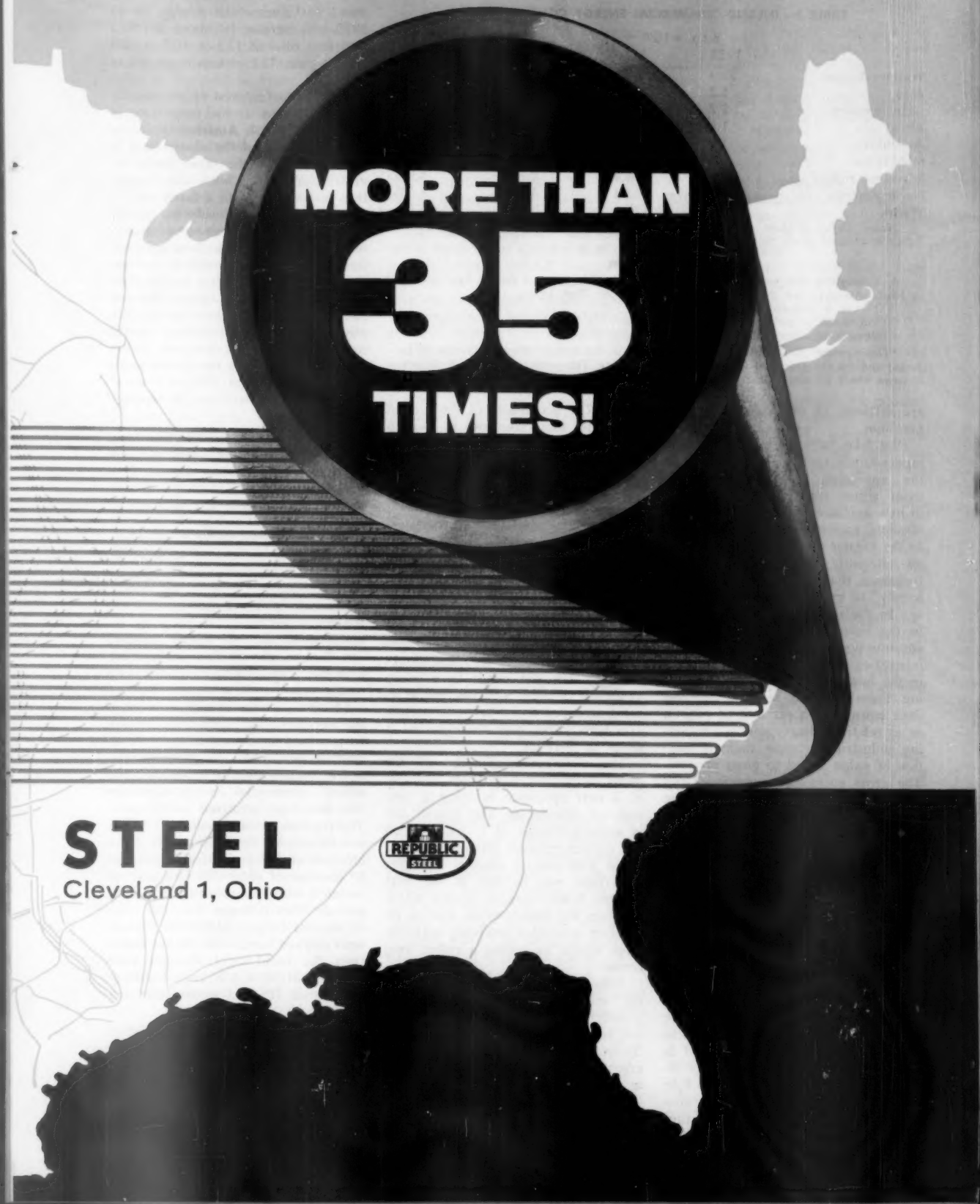

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"It is reasonable to expect energy demand in western Europe to slacken."

TABLE 3—INLAND COMMERCIAL ENERGY CONSUMPTION

	B.t.u. x 10^{15}		Comparative Trends*	
	1958	1970	1958-70	1948-58
Western Europe	23.4	32.8	2.5%	4.2%
Asia	5.3	10.5	6.0%	6.0%
Latin America	2.7	6.1	6.6%	8.2%
Africa	1.8	3.4	5.4%	6.2%
Australasia	1.2	2.1	4.6%	5.3%
Middle East	0.7	1.9	10.1%	10.1%
World ex. N.A.	35.1	56.8	3.7%	4.9%
North America	42.6	65.4	3.4%	2.5%
World	77.7	122.2	3.6%	3.5%

Notes: Ocean bunkers excluded. Hydroelectricity and nuclear power converted to B.t.u.s at thermal power station input.

Area Definitions

1. Throughout this study Latin America excludes Mexico and Puerto Rico (included in North America) but includes the remainder of the West Indies.
2. Turkey is included in the Middle East.
3. Yugoslavia is included in Western Europe.
4. Oceania is included in Australasia.

*The average annual increases shown are for the trends observed in the historic period and for the estimated future period respectively. This presentation avoids distortion in cases where an actual base year is "off trend."

are difficult to determine with any precision.

(We take "efficiency" to mean the input/output ratio of energy used in the appliance. Improvements stem from either technical improvements in new appliances, the replacement of obsolete appliances by modern ones, or the greater use of fuels which have an inherently better combustion performance than others. We take "intensity" to mean the degree of intensity in the use of commercial energy in the economy, i.e. the net energy consumption/gross product ratio. Use intensifies as per capita consumption in the home rises, as energy-consuming industries and services increase their consumption per unit of output, or as relatively heavy energy-consuming industries increase their proportion of value added to gross product. The gross energy consumption/GNP ratio is a function of both these factors.)

Intensity. There is a prima facie assumption that energy intensity in an economy follows first an upward S-curve and eventually declines. The dormant economy uses little commercial energy. The developing economy intensifies use as living standards rise and as heavy energy-using industries like steel, power, bricks, and cement tend to expand rapidly.

In the mature economy the curve flattens out and finally turns down as saturation points are reached and as more of gross national product is devoted to those services which are light energy consumers. At what point does this S-curve flatten out and turn down? The economies of the United States and some countries in western Europe have been becoming less energy intensive for some time, but there are many countries elsewhere where intensity is likely to increase for many years.

Efficiency: The curve of efficiency should also be an S-curve. For an appliance, the curve is asymptotic moving towards infinity at the upper end as marginal increments become costly and uneconomic. The total trend S-curve is in effect made up of as many S-curves as there are dissimilar types of appliance. A major technical breakthrough does not result in a move along one of these S-curves, but in its being scrapped and a new one started. The total curve may therefore be a series of S-trends.

The widespread adoption of the diesel locomotive is a recent example of a new appliance bringing a new scale of efficiencies. The greater use in western Europe of fuel oil, which has certain inherent efficiencies compared with coal is another example; its effects will be felt in the next decade. A steel-making process which bypasses the blast-furnace process altogether is another tempting improvement which lies round a rather long corner.

Although we have taken account of the relationship between economic growth and energy growth, we have not relied on precise correlations to the exclusion of other evidence of energy growth, particularly the end uses to which energy is put.

An examination of relevant factors leads us to the conclusion that demand for commercial energy up to 1970 will increase by about 3½% a year to a total of 122 × 10^{15} B.t.u.'s in that year. The pattern is set out in Table 3.

The point of interest which immediately stands out is the faster rate of increase in **North America** compared with the past and the slower rate in western Europe, the other major industrial area. It is with some hesitation that we estimate a faster rate in the area which is already by far the largest per capita consumer of energy in the world and in which an acceleration of economic growth is not expected, but we feel that this is justified by the reduced scope for improvement in efficiency in use discussed above. In particular, of the order of 50 million tons of coal a year are now being saved compared with railroad use in 1950; a "bonus" in saving which will not be repeated in the future.

Western Europe on the other hand has just come through a period of abnormally fast economic growth. It is reasonable to expect energy demand to slacken and with the prospect of greater use of oil and gas in industry, a period of improvement in efficiency in use can be anticipated such as the United States has already passed through.

The rate of energy growth in all the less-developed areas is likely to remain faster than in North America and Europe, though in some of them it is likely to slacken compared with recent years.

(A check on the rate of increase in the world outside North America can be provided by a comparison with industrial production. A good correlation between industrial production and inland commercial energy consumption has been observed in the past. The regression coefficient for 1921-58 is 0.68 and for 1948-58 is 0.60. A coefficient of 0.7 for 1958-70 gives an IP increase of about 5¼% a year associated with our estimate of energy growth. This is lower than the trend of the last 10 year [1948-58; 7% annual average increase in IP] but higher than the trend right through from 1921 [1921-58: 4.4% annual average increase in IP] and would seem reasonable).

Latin America has already moved into a period of slower economic growth than before 1958. Energy consumption is expected to move a little closer to unity with GP partly as substitution for noncommercial fuels

"Saharan gas is almost certain to be available in western Europe."

slows down and partly as a result of the more realistic prices for commercial energy which will almost certainly have to be paid in many countries. The result is a deceleration in energy consumption from a postwar rate of over 8% a year.

In **Africa,** a somewhat slower rate of increase is mainly due to the heavy weighting of the Union of South Asia in the whole; a slower rate of economic growth is expected there.

Demand in the **Middle East** appears to be growing faster than in any other area (a reliable estimate is difficult to make), but it is likely to remain relatively small.

In **Asia** steady trends have been observed since 1951, except in India where energy consumption has been accelerating since 1952; the growth rates forecast approximate to the 1955-58 rate in India and to the 1951-58 rates elsewhere.

In **Australasia,** a slightly higher rate has been taken than obtained in 1950-58, to allow for the check to growth sustained by energy consumption in the economic recession of 1957-58.

Competing Energy Sources

In striking a balance between energy sources it is of course their competitive and not their complementary uses which are significant. Over the next 10 years the relationship between coal, natural gas, and oil will be crucial. The competitive strength of each source is discussed below.

Consumption of **hydroelectricity** has grown at a steady rate in the past and is likely to continue to do so in the next 10 years. In Europe, some countries which have relied extensively on water power will be reaching the limits of their economic potential by 1970, but the problem will not be acute during the 1960's. In many less-developed areas the potential is large, but lack of demand in the vicinity of many suitable sites will limit expansion, as will capital scarcity, even though hydroelectric projects are favored candidates for World Bank loans.

Outside North America **natural gas** is a relative newcomer. Future demand will largely be a function of supply and price. Expansion could be vigorous. First, new and developing fields in areas as diverse as France, Argentina, and Pakistan will be exploited.

Secondly, Saharan gas is almost certain to be made available to western Europe by one means or another towards the end of the period.

Thirdly, as the search for oil spreads the likelihood of finding new reserves close to potential markets is increased. Lastly, gas from any oil field will be capable of finding more distant markets if the carriage of frozen methane proves to be economic; the costs of frozen gas are still in doubt.

For these reasons we have allowed for a much larger increase in natural-gas consumption outside North America than in any other energy source. The margin of error in these gas estimates is large, but the weighting in the total balance is in any case small.

Too much has been written about **atomic power** to require extensive repetition here. It has been likened to an infant, to a young sportsman of promise from whom too much has been expected too soon, even to the glamor girl of the family, with plenty of appeal but not quite what you want if you are looking for a maid of all work. Most has been expected of it as a means of bulk base load electricity generation in the developed areas of Europe. At first the public imagination was caught and there was great enthusiasm.

But no technical breakthrough followed and the European energy gap (the immediate political justification for early and large atomic-power programs) closed of its own accord. Pessimism now prevails. Should it color our longer-term view? Almost certainly yes; technical development looks like a long haul and with the political justification g o n e, more stringent economic criteria are required before atomic power will be attractive.

We therefore consider that in 1970 atomic energy will only contribute of the order of 1% of world inland energy consumption. This will be virtually all in the form of electricity. The only other substantial use likely in the period is in naval vessels, where the strategic advantage of long steaming times without refueling outweighs economic criteria.

Coal and Oil. These cover a wider range of mutally competitive uses than other energy sources. A direct comparison is therefore of value. Cost, foreign exchange, and suitability are all relevant.

Cost. Attempts at direct specific comparisons are meaningless: transport costs vary greatly from place to place and fuel oil cannot be costed independently of other refinery products. The interesting thing to do is compare the relative broad pressures on the costs of both industries. Being extractive industries, the pressures have much to do with the state of their reserves.

In the U. S., coal reserves are prolific and increases in productivity are possible; the pressure as the years pass is not so great as it is upon the domestic oil industry.

In Europe the reverse is the case. It draws the supplies of oil it requires from fields many of which have adequate, even prolific, reserves (and the added transport cost is economic). Its reserves of coal are not prolific and the number of seams easy to work is diminishing.

There is little prospect for productivity increases at present levels of production whereas wages, which form about 60% of total costs, are likely to increase at about the average rate in European economies (probably not higher than this as the miner loses his scarcity value).

The marginal cost of European coal production is therefore now too high for the industry to retain a flexible supply at a competitive cost. Hitherto the coal industry has used the price weapon in Europe remarkably little. Competition will continue to exert a greater pressure on both coal and fuel-oil prices. The oil industry's costs are such that it is better placed than coal to meet this competition.

Will coal from the U. S.—there is no other known area of large reserves in the World outside the Soviet sphere—be competitive with oil in World markets? Probably not; the transport of coal is at a disadvantage with oil both on handling costs and on calorific value/weight ratio. The recent very low coal freights are likely to rise in future and the amount of coal exported from the U. S. other than coking coal will be marginal.

Imported vs. indigenous fuels. As the balance of payments of most industrialized areas become more favorable, less prejudice is felt against imported fuels, particularly in countries like Britain which tolerate large import bills for other raw materials as a matter of course. Some of the resources deflected from uneconomic production of marginal indigenous fuels will in any case be capable of earning or saving foreign exchange.

"Both oil and gas may take larger markets from coal than allowed for."

In these areas security of supply has been the stronger argument in favor of indigenous fuels, but the inexorable facts of supply and cost are against it, while the diversification of supply which accompanies the natural development of the oil industry mitigates its force.

Protection of high-cost indigenous fuel production on socio-economic grounds is unlikely to become prevalent in the longer term unless severe economic fluctuations set in.

For those underdeveloped areas which lack indigenous fuels, fuel imports represent a large and growing proportion of the total import bill and lack of foreign exchange will continue to condition their attitude towards oil imports.

Suitability and quality. These are factors which tend to favor oil. On the whole, oil can command a premium for ease of handling and efficiency in the appliance. It is also difficult for a solid fuel to match the remarkable flexibility with which liquid fuels can be made to meet ever more diverse and exacting qualities. The day when coal should be regarded as a raw chemical for its carbon is still distant, but it should be increasingly used to produce secondary energy, (which can command a premium price) whether dissimilar to itself as in electricity generation or emanating from it as in a total gasification process.

This is a difficult moment to assess the relative future consumption of coal and oil in competitive uses. It is possible that both oil and gas may take larger markets from coal than we have allowed for. Even so, a dramatic decline in demand for coal cannot be anticipated.

Complementary Uses of Oil

One of the strengths of oil demand is the range of uses, notably in transport, in which it is not challenged by other energy sources. This is a wider range than is enjoyed by the coal industry; the only truly complementary use of coal is to produce metallurgical coke. Some of the end-use factors affecting demand for two of the complementary uses of oil, automotive fuels, and ocean bunker fuels, are discussed below.

Motor Vehicles. The vehicle park in the world outside North America grew by about 12% a year between 1948 and 1957. Growth was rapid in the immediate postwar period as wartime depletions were made good. A rate of about 9% a year can be expected to hold through to 1970. The proportion of private cars to commercial vehicles is not expected to change, but the proportion of diesel-engined vehicles is expected to grow to almost 45% of total commercial vehicles in the world excluding North America by 1970 and an even higher proportion in Europe alone.

Because of this anticipated switch to diesel-engined commercial vehicles, consumption of automotive gas oil is expected to increase at a faster rate than gasoline consumption. Another consequence of the switch is expected to be an accentuation of the present trend to declining unit consumption (automotive gas oil and gasoline) per vehicle, especially in industrial areas of the Eastern Hemisphere. The preponderant weighting of these industrial areas in the world outside North America, coupled with a slower growth in vehicle demand, means that some decline in the rate of increase in total consumption of automotive fuels must therefore be expected.

Bunkers. Dry-cargo trade is broadly related to growth in manufacturing production and industrial raw materials and also to the somewhat slower growth in demand for food. Up to about 1957 seaborne trade in raw materials and manufactures was increasing rather faster than manufacturing production, but overstocking in the last year or two of this period and the subsequent fall in the coal trade

TABLE 4—INLAND CONSUMPTION OF COMMERCIAL FUELS

(a) World excluding North America

B.t.u. × 10^{15}

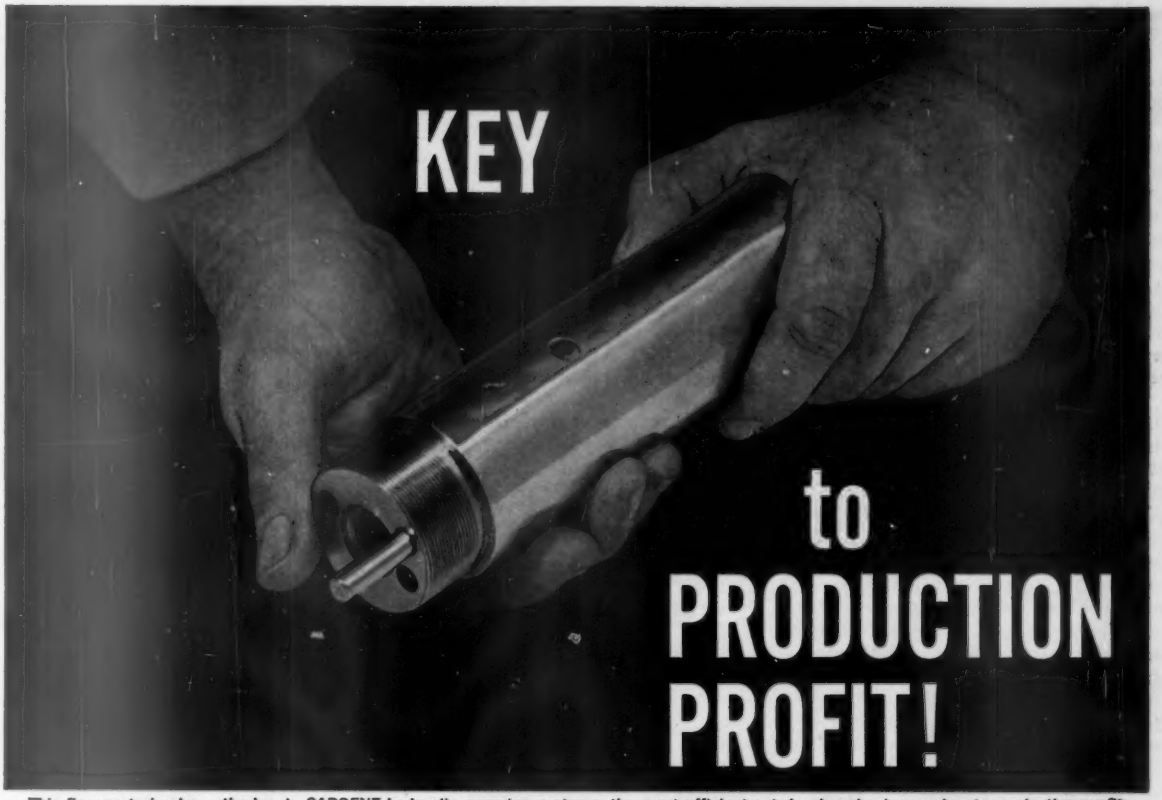
		West Europe	Africa	Middle East	S. and E. Asia	Australasia	Latin America	TOTAL	Average annual increase	
Solid fuels	1958	14.75	1.13	0.14	2.78	0.67	0.25	19.72	48-48	2.5%
	1970	13.65	1.81	0.20	4.84	0.93	0.35	21.78	58-70	0.3%
Petroleum fuels	1958	5.33	0.58	0.53	1.45	0.38	1.84	10.11	48-58	12.1%
	1970	12.30	1.28	1.51	3.90	0.71	3.95	23.65	58-70	7.3%
Natural gas	1958	0.26	....	....	0.04	....	0.21	0.51	48-58	18.4%
	1970	1.37	0.05	0.16	0.13	....	0.70	2.41	58-70	13.3%
Hydroelec.	1958	3.04	0.09	0.02	0.98	0.15	0.44	4.72	48-58	5.6%
	1970	4.37	0.25	0.08	1.57	0.42	1.11	7.80	58-70	4.4%
Nuclear elec.	1958	....	....	....	....	....	....	....	48-58	....
	1970	1.09	....	....	0.04	....	....	1.13	58-70	....

(b) North America

B.t.u. × 10^{15}

	1958	1970	Avg. annual increase 1958-70	Avg. annual increase 1948-58
Solid fuels	10.42	15.74	3.0	−3.0%
Petroleum fuels	18.57	28.78	3.4	5.1%
Natural gas	10.84	16.95	3.2	8.0%
Hydroelectricity	2.80	3.67	2.6	2.4%
Nuclear electricity	Neg.	0.27	....	....

Notes: Ocean bunkers excluded. Hydro and nuclear electricity converted at thermal station input equivalent. Average annual increases are comparative trends.



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have brought the growth of trade and production more into line.

The future growth of seaborne trade should again be faster than that of manufacturing production, mainly because the amounts of one or two raw materials, notably iron ore, entering seaborne trade are increasing rapidly; but the average rate of increase is unlikely to be as fast as obtained between 1950 and 1957. The rise in bunkers for dry cargo ships will be less marked still, simply because their recent fall was not as great.

The current large surplus of world shipping tonnage has tended to reduce the ratio of cargo carried to cargo capacity per vessel and this has cushioned the recent fall in bunker demand. The proportion of motor ships in dry-cargo trade is increasing but many new motor vessels are burning fuel oil and there will not be a corresponding increase in the proportion of lighter fuels used. A further decline in the number of coal-burning ships can be expected.

Tanker bunkers will increase faster than dry-cargo bunkers and are likely to take over half the total by 1970.

Forecast for Each Energy Source

In making our forecast we have taken account of the factors noted above. We have examined each fuel in each area, taking many of the larger countries individually. We have **not** taken oil as a balancing item. The method is inaccurate in that errors in our consumption elsewhere would be multiplied in the oil estimate and demand for oil is now too strong to admit it as a valid concept. Indeed there are cases in which coal has now become a "balancer," in the sense that most uncertainty surrounds its future and after careful appraisal of other fuels, it is taken as a residual.

Inland energy demand. Table 4 realigns the forecast of inland commercial energy consumption in terms of the relative growth of each primary source of energy.

Some of the more interesting features of the relative strength of the primary energy sources in each area are noted below:

In the **United States,** the decline in coal consumption is expected to be reversed fairly soon as substitution in the heating market becomes less severe and as the basic markets of steel and power continue to expand. Competition from natural gas may continue to be strong (for oil as well as coal) and it is significant that in 1958 some of the expansion which has been going on for some years in the use of gas for power generation, for the first time revealed an absolute decline in consumption of coal in power stations.

In **western Europe** an absolute decline in coal consumption has been assumed. Imports of U. S. coal will be mainly for coking and will certainly not be massive. The estimate for atomic power is somewhat pessimistic in the light of the current lack of new project plans. Most of the incremental energy requirement will be oil, though some room will have to be made for natural gas. In assessing natural-gas consumption we have allowed for some imports from the Sahara and the Western Hemisphere.

In **Latin America,** oil will still be the dominant energy source, and is only likely to lose a small margin of its two-thirds share of the commercial energy market and this to natural gas. Although there are reserves of coal, some of them quite large, in most of the countries, an increase in consumption will be influenced in the main by the needs of the steel industry and is expected to be modest.

In **Africa,** an increase in indigenous supply of oil and gas will be a factor increasing the rate of consumption somewhat, but not markedly. Growth in coal consumption will decelerate mainly because of somewhat slower economic growth in the Union of South Africa.

In **Japan,** the phenomenally high rate of expansion of oil consumption during the reconstruction period did not settle down till 1953. The subsequent deceleration is likely to continue slowly until about 1963, but demand will still increase strongly throughout

TABLE 5—WORLD OCEAN BUNKER DEMAND—1958 AND 1970
(Thousands of barrels per day equivalent)

	1958	1970	Avg. annual increase
World excl. North America:			
Oil	1,085	1,634	3.5%
Coal	26	13	
North America	383	451	1.4%
	1,494	2,098	2.6%

(Coal bunkers in North America are negligible.)

TABLE 6—TOTAL DEMAND FOR COMMERCIAL ENERGY
B.t.u. × 10^{15}

	North America		World excl. North America		Total	
	1958	1970	1958	1970	1958	1970
Inland trade	42.6	65.4	35.1	56.8	77.7	122.2
Bunkers	0.8	1.0	2.4	3.6	3.2	4.6
	43.4	66.4	37.5	60.4	80.9	126.8

TABLE 7—TOTAL DEMAND FOR PETROLEUM PRODUCTS
(Million B/D)

	North America		World excl. North America		Total	
	1958	1970	1958	1970	1958	1970
Inland fuels	9.2	14.2	5.0	11.7	14.2	25.8
+ Bunkers	0.4	0.5	1.1	1.6	1.5	2.1
= Total petroleum fuels	9.5	14.6	6.1	13.3	15.6	27.9
+ Nonenergy products	0.6	1.0	0.3	0.5	0.8	1.5
= Total product trade	10.1	15.6	6.4	13.8	16.5	29.4
AAI total product trade		3.7%		6.7%		4.9%
AAI inland fuels		3.7%		7.3%		5.1%

N.B. Figures do not sum because of rounding.

the period. Coal production is not expected to regain the 1957 peak until 1964, despite rationalization of high-cost production and the rate of increase in consumption is expected to be less than 3% a year.

In **India,** coal will continue to provide the greater share of the market; substantial investments are being made in the industry which will fructify in the later part of the period.

In the rest of **Asia,** the most notable factor is the future of natural gas in Pakistan; its impact is so recent that trends in its use are difficult to predict. Natural-gas consumption in the area as a whole is estimated to grow at 9.6% a year and to continue 4% of total commercial energy demand by 1970.

In **Australasia,** the growth of oil consumption has decelerated slowly but steadily since 1953. This trend is expected to continue for some time giving an average increase of 5.5% a year to 1970 compared with 7.75% since 1951.

Demand for bunkers. The factors relating to seaborne trade discussed above suggest an estimate as shown in Table 5. (This has been expressed in terms of barrels per day equivalent owing to the small size of the figures for coal bunkers.)

Total Energy Demand

The aggregate demand for commercial energy shown in all the above estimates is as shown in Table 6.

The total rate of increase is still likely to be higher outside North America than in it, but in 1970 demand in North America will still be larger than in all the rest put together.

Forecast for Oil Products

The estimates of demand for petroleum fuels are reexpressed in Table 7, with an estimate for nonenergy products, in terms of volume.

Variations round trend. Apart from the margin of error in the estimated trend, 1970 is of course regarded as a trend year. Deviations round trend in the world outside North America during the past 10 years have been less for petroleum fuels than for energy consumption as a whole. The standard deviation for petroleum has been under 2%, though the maximum was 3.75% (c.f. 2.2% and 4.8% respectively for total energy). As petroleum fuels increase their share of the energy market, fluctuations in their consumption are bound to conform more closely to fluctuations in total energy consumption and a somewhat wider deviation may be expected by 1970. It is already wider in North America.

In North America demand for petroleum products will increase at about the same rate as total energy; in volume the annual increase will average nearly half a million barrels per day. Outside North America, petroleum demand will increase considerably faster than total energy demand; in volume the annual increase will average about 600,000 bbl. per day. This is a healthy position. In Europe, the largest market outside North America, the share of the competitive fuel market at present held by oil is small. Customers are beginning to realize the convenience, economical operating, and flexibility of use of oil products; governments, the ability of the industry to meet an ever-growing demand without placing an undue burden on the economy.

To maintain its share of demand in North America, the largest energy market in the world, excluding the Soviet sphere, and to increase its share of a faster growing market elsewhere; this is the challenge for oil in the next 10 years.

Reference

1. "Some Major Determinants of Future Oil Requirements and Supply," by Walter J. Levy and Milton Lipton.

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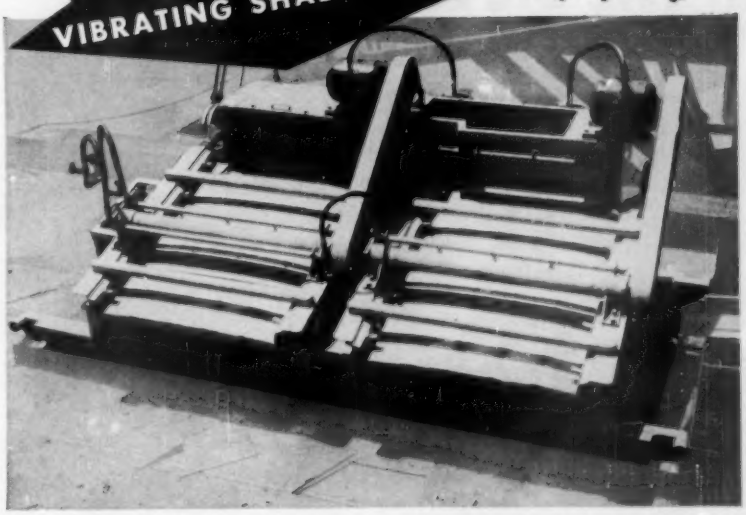

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BY LOREN F. KAHLE, Transportation Coordinator, Standard Oil Co. (N. J.)

In direction and in degree the outlook for the tanker industry is still about the same as we reported in the Journal last year. Some readers may recall the headline of that article: "Tanker Surplus Will Get Bigger." More of the same is the outlook today, as . . .

Tanker surplus keeps growing

THE TREND toward increasing tieup has continued in 1959 and many tanker operators have surplus capacity in their working fleets. Scrapping has increased in tempo this year although the scrap values of tankers are still very low. Spot charter rates have persisted at extremely low levels and about 75 tankers are finding employment in the grain trade. About 14 T-2 type turboelectric vessels have been prepared to serve as power stations in Scandinavian countries this coming winter. In spite of the poor state of the tanker market, new tanker deliveries continue. We expect that the high point in tanker deliveries from world shipyards will probably be reached this year; however, 1960 will still see an extremely high level of deliveries, well exceeding the forecasted increase in demand. Thus, tanker supply is still increasing more rapidly than the tanker demand in spite of the current high level of tieup, slowdown, etc.

Recent trends

The chart shows a summary of the free-world commercial tonnage supply-demand balance as of about October 1, 1959. The total availability of 3,284 T-2's represents ownership roughly in the ratio of 65% by independent tanker owners and 35% by oil companies. Requirements, however, total 2,796 T-2's. The combined surplus in the form of physical tieups or inactive vessels is 488 T-2's or about 15% of the available ships.

As shown on this historical plot, shortly after the first quarter of 1957 when the Suez Canal was reopened, the tanker-utilization line and the availability line began to diverge. Except for a spurt in utilization in late 1958—early 1959 reflecting for the most part an accelerated tempo of crude and product imports into the United States, this utilization line has continued to diverge until—at end of September—488 T-2's were in tieup status. It is of interest that both U. S.-flag and foreign-flag tonnage are about equally overcovered, that is, 15% of the available tonnage is in tieup. In addition to the vessels physically tied up, it is estimated that another 200 T-2's of surplus exists in the form of slowdown, around-the-Cape movements, and some spare pipeline capacity in the Middle East. In

THE 47,000-D.W. TON Esso Stuttgart, owned by Esso Tankschiff Reederei, GmbH, is the first of several tankers this size under construction for Standard Oil Co. (N. J.) affiliates.

TABLE 1—ESTIMATED POTENTIAL INDUSTRY TONNAGE POSITIONS

	Average year T-2 equivalents				
	1959	1960	1962	1964	1966
Available tonnage:					
Total beginning of year	3,000	3,380	4,090	4,465	4,740
New deliveries	450	435	310	230	230
Less scrappings, conversions, etc.	(70)	(70)	(80)	(90)	(100)
Total year end	3,380	3,745	4,320	4,605	4,870
Tonnage supply-demand balance:					
Average-year availability	3,190	3,560	4,205	4,535	4,805
Estimated average-year requirements	2,760	2,880	3,050	3,280	3,505
Theoretical surplus	430	680	1,155	1,255	1,300
Per cent surplus	13	19	27	27	27
	Potential deliveries assumed during calendar year				
	1959	1960	1962	1964	1966
United States yards	60	45	30	30	30
Foreign yards	390	390	280	200	200
Total	450	435	310	230	230

total, then, the industry tanker fleet has slightly over 20% spare capacity when measured against the capacity of operating at normal speeds and over normal routes.

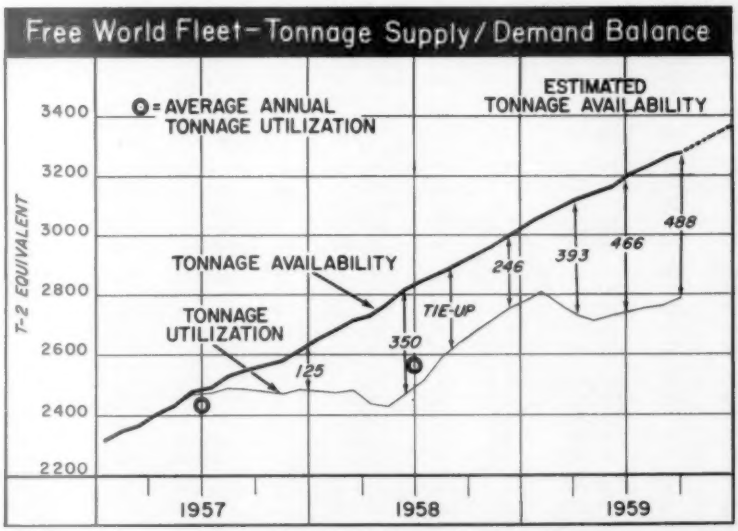
All indications point to the tanker industry having to look forward to a long period during which tanker availability will remain on the high side of tanker demand, thus continuing to exert a depressing influence on charter rates of all types. In spite of this fact, competition in the industry indicates clearly that the economic incentives to build large ships in order to scrap or idle small ones are considerable (small means vessels in the T-2 size running up to some of the early post-war construction of 20,000 - 25,000 tons deadweight).

More than half of today's tied-up fleet consists of vessels built subsequent to World War II with about 20% of the vessels over 20,000 tons. Continued surpluses of these fairly new and relatively large vessels will undoubtedly tend to keep spot-market charter rates at low levels as long as such surpluses exist.

Supply-demand outlook

Table 1 summarizes the future tanker supply-demand outlook for 1959 projected through 1966. Looking down the road, indications are that the tanker surplus could continue to increase and by the mid-60's might represent 27% of tanker availability. The high level of new deliveries plus the still sizable backlog of tankers under construction or on order will add new units to the existing tanker fleet at a greater rate than world-wide tonnage requirements increase. Table 1 illustrates the estimated increase in tanker availability on an average-year basis. With this significant increase in tanker availability playing against a fairly slow increase in requirements, it seems probable that in the near future the composition of the tied-up surplus will be predominantly vessels of post-World War II construction. By the early 1960's ALL vessels older than 16 years (i.e. vessels built during or prior to 1946) would be theoretically surplus to the world's tanker needs; this of course would include all the T-2 type vessels. Even so, many vessels of post-1946 construction will have to be idle. In reality, of course, due to loading and discharge port limitations and for other reasons, some vessels built during World War II or earlier will undoubtedly remain in operation through the forecast period.

In spite of the growing tanker surplus, oil companies and many independents have tanker-building programs of large vessels because the economics of the larger tankers enable them to cover total costs in these vessels at freight rates below the out-of-pocket cost levels of the 16,000-20,000 vessels now in layup. Since there is not an unlimited scrap market and there are over 8 million deadweight tons of dry cargo vessels in layup, it seems likely that a considerable part of the excess tonnage might remain in an "inactive reserve" tieup



FREE WORLD commercial fleet, tankers of 6,000 d.w. tons and over excluding government and miscellaneous specialty vessels.

Surplus facts . . .

Combined surplus totals 488 T-2's, or 15% of available ships.

Surplus could grow to 27% of tanker availability by mid 60's.

More than half of today's tied-up fleet consists of post-war-built vessels, 20% having capacities over 20,000 tons.

BUT—oil companies and independents have tanker-building programs of large vessels because of more favorable economics.

TABLE 2 — WORLD TANKER TONNAGE AS OF OCTOBER 1, 1959

	U. S. flag			Foreign flag			Total		
	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.
6,000-16,000	40	490,336	28.0	700	8,749,157	444.0	740	9,239,493	472.0
16,001-20,000	209	3,555,393	218.4	981	17,264,661	1,034.5	1,190	20,820,054	1,252.9
20,001-30,000	50	1,247,459	83.1	375	9,228,269	578.1	425	10,475,728	661.2
30,001-40,000	35	1,135,672	79.0	287	9,740,965	651.3	322	10,876,637	730.3
40,001-50,000	2	87,195	6.1	79	3,489,804	236.4	81	3,576,999	242.5
50,001-60,000	....	.....	.....	6	319,072	21.7	6	319,072	21.7
60,001-70,000	....	.....	.....	4	246,980	17.5	4	246,980	17.5
70,001-80,000	....	.....	.....	1	71,282	4.9	1	71,282	4.9
Over 80,000	....	.....	.....	8	705,361	42.3	8	705,361	42.3
Total	**336**	**6,516,055**	**414.6**	**2,441**	**49,815,551**	**3,030.7**	**2,777**	**56,331,606**	**3,445.3**
							Average vessel	**20,285**	**1.24**

NOTE: World tanker tonnage excluding military and USSR.

status. The availability of these vessels will undoubtedly have an effect upon the degree and rapidity of any upward swing in charter rates which could be caused by any sudden additional demand. Thus, tanker charter rates are expected to remain low for some time.

Today's tanker fleet

Table 2 shows the free-world commercial tanker fleet as of October 1, 1959. The 2,777 vessels total about 56,332,000 d.w. tons and are equivalent to 3,445 T-2 tankers. The average tanker in the free-world fleet today is about 20,285 d.w. tons, an increase of over 1,000 tons since a year ago.

The world tanker fleet, including government and military vessels (300 gross tons and over) is shown in Table 3 by flags of registry. Compared to a year ago, the United States has slipped to fourth position, with Norway moving from fourth place into third.

Liberian and British registry again account for first and second positions respectively. Although the United States ranks fourth in total deadweight tons, the carrying capacity of the U. S. flag fleet, equivalent to 551 T-2's, places it second only to Liberia in this respect.

As mentioned earlier, new tanker deliveries from shipyards in the free-world are running at all-time high rates. Table 4 shows new vessels approximating 330 T-2 equivalents were delivered in the 9 months ending October 1 this year, compared to 317 for the corresponding period last year.

Although it can be expected that some of the remaining 188 new T-2 equivalents indicated for 1959 will slip into next year, new deliveries this year are estimated at 450 T-2 equivalents.

Table 5 shows a breakdown of the tankers on order or under construction as of October 1, 1959. Of the total number of 1,457 T-2 equivalents under construction or on order, 34% are in the 40,001-50,000-d.w.-ton range, and 56% are 40,001 tons or larger.

Conclusions

In conclusion, tanker supply apparently is still increasing more rapidly than tanker demand, in spite of the

Table 3—World's Tanker Tonnage—Classified by Flag

	Grand total			Vessels 6,000 d.w. tons and over							Vessels under 6,000 d.w. tons	
				Total			Steamship		Motorship			
Country of registry—	World ranking	No.	D.w. tons	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	No.	D.w. tons	No.	D.w. tons
United States	4	783	9,026,786	453	8,548,377	551.2	445	8,418,225	8	130,152	330	478,409
Liberia	1	420	11,535,081	409	11,509,886	743.6	351	10,493,288	58	1,016,598	11	25,195
Britain	2	769	9,645,454	534	9,283,016	542.5	249	5,350,683	285	3,932,333	235	362,438
Norway	3	533	9,249,829	480	9,138,977	540.1	49	1,284,700	431	7,854,277	53	110,852
Panama	5	199	3,975,426	182	3,917,298	245.1	135	3,098,861	47	818,437	17	58,128
France	6	181	2,715,033	118	2,596,076	161.6	57	1,350,887	61	1,245,189	63	118,957
Italy	7	182	2,401,168	124	2,322,804	141.5	66	1,404,804	58	918,000	58	78,364
Sweden	8	160	2,302,138	120	2,267,855	136.9	4	107,230	116	2,160,625	40	34,283
Japan	9	205	1,972,060	84	1,806,814	109.0	45	999,137	39	807,677	121	165,246
Netherlands	10	135	1,929,858	108	1,881,165	112.3	63	1,192,949	45	688,216	27	48,693
Denmark	11	75	1,312,799	67	1,308,288	78.5	2	69,000	65	1,239,288	8	4,511
Russia	12	122	948,137	70	841,829	49.2	4	50,530	66	791,299	52	106,308
West Germany	13	95	930,377	39	851,819	52.7	17	465,379	22	386,440	56	78,558
Greece	14	46	516,457	24	485,483	29.3	15	361,209	9	124,274	22	30,974
Spain	15	51	509,479	37	471,469	25.9	4	33,039	33	438,430	14	38,010
Argentina	16	57	473,384	29	398,022	22.1	16	203,349	13	194,673	28	75,362
Brazil	17	39	324,989	16	286,505	16.9	3	74,900	13	211,605	23	38,484
Canada	18	44	302,160	12	222,286	13.9	11	215,966	1	6,320	32	79,874
Belgium	19	14	254,646	13	254,226	15.6	6	153,092	7	101,134	1	420
Venezuela	20	29	252,233	17	197,807	10.0	14	158,374	3	39,433	12	54,426
Finland	21	19	241,189	15	236,170	13.5	....	.....	15	236,170	4	5,019
Mexico	22	20	191,824	16	173,323	7.6	10	104,347	6	68,976	4	18,501
Honduras	23	10	156,412	8	154,889	8.9	5	109,545	3	45,344	2	1,523
Portugal	24	13	151,915	9	143,927	8.3	1	27,469	8	116,458	4	7,988
Nationalist China	25	18	101,029	5	83,745	4.4	3	59,117	2	24,628	13	17,284
Poland	26	11	94,804	6	83,495	4.4	1	12,020	5	71,475	5	11,309
Turkey	27	12	86,292	5	76,908	4.1	4	62,268	1	14,640	7	9,384
Yugoslavia	28	7	54,992	4	49,268	2.5	....	.....	4	49,268	3	5,724
Saudi Arabia	29	1	46,548	1	46,548	3.2	1	46,548	....	.....	....	.....
Kuwait	30	1	46,000	1	46,000	3.0	1	46,000	....	.....	....	.....

TABLE 4—TANKERS REPORTED UNDER CONSTRUCTION OR ON ORDER OCTOBER 1, 1959

Yard	No.	D.w. tons	T-2 equiv.	Contract delivery dates T-2 equivalent 1959	1960	1961	1962	1963	1964	1965	Unknown
United States—U. S. registry	18	838,776	60.9	14.9	25.9	12.9	7.2	....	....	....	....
United States—Foreign registry	7	342,500	21.2	6.3	12.7	2.2	....	....	....	....	....
Total U. S. yards	25	1,181,276	82.1	21.2	38.6	15.1	7.2	....	....	....	....
British	112	3,729,950	247.8	24.5	66.5	64.1	36.7	37.4	18.6	....	....
Canadian	1	40,000	2.7	....	2.7	....	....	....	....	....	....
Swedish	83	3,203,155	212.8	26.8	57.9	55.8	35.2	34.4	2.7	....	....
Norwegian	39	1,055,600	70.1	1.3	14.3	11.0	17.7	12.1	8.1	5.6	....
Danish	25	722,800	47.9	4.5	14.1	5.7	11.0	6.2	3.2	3.2	....
French	36	1,696,944	112.8	8.4	42.7	28.0	20.7	10.8	....	....	2.2
Spanish	26	532,950	35.3	2.6	9.5	9.8	5.4	....	....	....	8.0
Netherlands	46	1,582,050	105.1	10.7	32.4	34.4	22.5	5.1	....	....	....
Italian	31	1,115,850	74.2	17.3	28.1	15.4	11.0	2.4	....	....	....
Belgium	11	367,580	24.5	1.7	7.6	7.8	6.1	1.3	....	....	....
Japanese	75	3,659,625	243.1	48.8	90.1	45.7	27.0	22.6	8.9	....	....
German	63	2,682,280	178.0	17.9	40.8	41.7	39.0	16.3	9.3	....	13.0
Portuguese	1	27,000	1.8	....	....	1.8	....	....	....	....	....
Yugoslavia	5	127,950	8.5	....	6.4	2.1	....	....	....	....	....
Greek	2	49,000	3.2	....	1.6	1.6	....	....	....	....	....
Formosan	2	72,000	4.8	2.4	2.4	....	....	....	....	....	....
Australia	1	32,250	2.1	....	....	....	2.1	....	....	....	....
Total foreign yards	**559**	**20,696,984**	**1,374.7**	**166.9**	**417.1**	**324.9**	**234.4**	**148.6**	**50.8**	**8.8**	**23.2**
Total U. S. and foreign yards	**584**	**21,878,260**	**1,456.8**	**188.1**	**455.7**	**340.0**	**241.6**	**148.6**	**50.8**	**8.8**	**23.2**

TANKERS DELIVERED

Yards—	Jan.-Sept. 1959 No.	Jan.-Sept. 1959 D.w. tons	Jan.-Sept. 1959 T-2 equiv.	1958 No.	1958 D.w. tons	1958 T-2 equiv.	1957 No.	1957 D.w. tons	1957 T-2 equiv.
United States—U. S. registry	11	367,350	25.2	14	443,778	30.9	8	269,350	19.6
United States—Foreign registry	9	466,203	32.7	7	312,766	22.1	3	103,850	7.2
Total United States	20	833,553	57.9	21	756,544	53.0	11	373,200	26.8
Foreign	144	4,212,298	272.5	213	5,910,935	386.5	167	4,755,667	312.7
Total	164	5,045,851	330.4	234	6,667,479	439.5	178	5,128,867	339.5
Deliveries reported 9-1-59	150	4,614,731	301.7	....	.....	....	....	.....	....
Deliveries reported 10-1-58-1957	...	.....	.....	172	4,852,144	316.6	124	3,712,198	242.7

(300 Gross Tons and Over) as of October 1, 1959

Country of registry—	World ranking	Grand total No.	Grand total D.w. tons	Vessels 6,000 d.w. tons and over—Total No.	Total D.w. tons	Total T-2 equiv.	Steamship No.	Steamship D.w. tons	Motorship No.	Motorship D.w. tons	Vessels under 6,000 dw. tons No.	Vessels under 6,000 dw. tons D.w. tons
Chile	31	4	44,300	2	34,638	2.0	2	34,638	....	.....	2	9,662
Peru	32	8	43,429	3	28,544	1.5	2	22,544	1	6,000	5	14,885
Israel	33	4	43,275	3	42,575	2.4	3	42,575	....	.....	1	700
Ireland	34	3	39,150	2	35,800	2.2	2	35,800	....	.....	1	3,350
Egypt	35	4	38,706	3	37,608	1.8	1	8,700	2	28,908	1	1,098
Uruguay	36	5	37,216	2	33,224	2.0	2	33,224	....	.....	3	3,992
India	37	4	24,997	2	23,297	1.2	1	10,172	1	13,125	2	1,700
Colombia	38	3	22,480	1	16,730	1.0	....	.....	1	16,730	2	5,750
East Germany	39	2	21,700	2	21,700	1.2	....	.....	2	21,700	....	.....
Czechoslovakia	40	1	19,290	1	19,290	1.2	....	.....	1	19,290	....	.....
Iceland	41	3	18,415	1	16,730	1.0	....	.....	1	16,730	2	1,685
Korea	42	4	16,948	1	7,420	0.4	1	7,420	....	.....	3	9,528
South Africa	43	1	16,615	1	16,615	1.0	1	16,615	....	.....	....	.....
Indonesia	44	3	11,100	....	.....	....	....	.....	....	.....	3	11,100
Pakistan	45	2	10,860	1	9,760	0.4	1	9,760	....	.....	1	1,100
Morocco	46	12	8,723	....	.....	....	....	.....	....	.....	12	8,723
Philippine Islands	47	6	7,144	....	.....	....	....	.....	....	.....	6	7,144
Cuba	48	4	5,720	....	.....	....	....	.....	....	.....	4	5,720
Dominican Republic	49	2	4,765	....	.....	....	....	.....	....	.....	2	4,765
New Zealand	50	1	3,325	....	.....	....	....	.....	....	.....	1	3,325
Ecuador	51	2	2,439	....	.....	....	....	.....	....	.....	2	2,439
Costa Rica	52	2	1,465	....	.....	....	....	.....	....	.....	2	1,465
Paraguay	53	1	1,015	....	.....	....	....	.....	....	.....	1	1,015
Iran	54	1	950	....	.....	....	....	.....	....	.....	1	950
Thailand	55	1	875	....	.....	....	....	.....	....	.....	1	875
Austria	56	1	697	....	.....	....	....	.....	....	.....	1	697
Lebanon	57	1	530	....	.....	....	....	.....	....	.....	1	530
Switzerland	58	1	440	....	.....	....	....	.....	....	.....	1	440
Total		**4,337**	**62,195,068**	**3,031**	**60,028,206**	**3,677.1**	**1,598**	**36,174,364**	**1,433**	**23,853,842**	**1,306**	**2,166,862**

NOTE: The above includes 54 combination ore and tankships of 1,290,806 d.w. tons equivalent to 79.8 T-2.

TABLE 5—WORLD TANKER CONSTRUCTION AS OF OCTOBER 1, 1959

	U. S. yards			Foreign yards			Total		
	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.	No.	D.w. tons	T-2 equiv.
6,000-16,000				33	403,200	26.8	33	403,200	26.8
16,001-20,000	1	16,200	1.1	103	1,961,605	130.3	104	1,977,805	131.4
20,001-30,000	4	116,000	8.1	42	1,070,500	71.1	46	1,186,500	79.2
30,001-40,000	2	67,650	4.9	172	6,085,253	404.2	174	6,152,903	409.1
40,001-50,000	14	642,000	44.1	144	6,695,530	444.7	158	7,337,530	488.8
50,001-60,000				7	360,900	24.0	7	360,900	24.0
60,001-70,000	2	132,926	9.2	37	2,454,300	163.0	39	2,587,226	172.3
70,001-80,000				17	1,281,640	85.1	17	1,281,640	85.1
Over 80,000	2	206,500	14.6	4	384,056	25.5	6	590,556	40.1
Total	**25**	**1,181,276**	**82.1**	**559**	**20,696,984**	**1,374.7**	**584**	**21,878,260**	**1,456.8**

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current high level of tieup, slowdown, etc. This comment applies to the annual average—or "trend"—components of the tanker supply-demand outlook. Short-term spurts in oil demand, which often occur during winter months, can and do cause some temporary increases in tanker needs—in fact, by late November 1959, there have been some recent net withdrawals of vessels from tieup.

In this article we have no intention of offering precise views on just how long the present tanker surplus will remain. This will depend on many factors, such as the growth of world oil demand, future supply sources and trade routes—all affecting the requirement outlook.

And finally, on the tanker-availability side, there are the uncertainties of new delivery rates in view of possible cancellations, the obsolescence rate of the older vessels and degree to which tanker operators may wish to protect themselves against international emergencies by maintaining spare capacity in the form of a laid-up fleet in a standby status.

BOOK

CHEMICAL PROCESS PRINCIPLES, PART 2: THERMODYNAMICS. By Olaf A. Hougen, Kenneth M. Watson, and Roland A. Ragatz. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. $9.75. 1,128 pp.

This is the second edition of Part 2 of "Chemical Process Principles" which brings together in one volume the theoretical development and practical applications of basic engineering science of thermodynamics, plus advanced treatment of the more specialized developments of chemical-engineering thermodynamics.

The book contains new material on such things as general methods for development of thermodynamic relationships, improved generalized tables of state and thermodynamic properties, thermodynamics of fluid flow including the cases of compressible fluids at sub and supersonic velocities.

Also covered are cycle analyses of modern internal-combustion engines including free-piston gas turbine, turbojet, ramjet, and rocket engines, solubility, detailed cycle analysis of modern vapor turbine-power units, solubility, thermodynamics of separation processes, vapor-liquid equilibria, and chemical equilibria.

How to purchase heads economically

A number of suggestions that may help you to reduce costs are contained in our new folder "Pertinent Facts on Purchasing Flanged and Dished Heads." Factors that govern the price of heads are described, and a list of the required data for orders and inquiries is included. Ordering from the stock sizes at Sparrows Point may save you time and money, and a full list is contained in the folder. A copy is yours for the asking at any Bethlehem sales office.

Bethlehem makes flanged-and-dished heads to meet virtually every requirement: ASME Code, elliptical and standard flanged-and-dished. Also flanged-only, dished-only, shallow-dished, double-dished, and heads for special requirements.

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BETHLEHEM STEEL

DITCH is cut along Dutch-German border after pipe has been welded, coated, and wrapped to permit immediate lowering in before ditch caves.

Rotterdam-Rhine line will supply German refineries next summer

FOUR SIDEBOOMS lower pipe into the ditch in long sections.

BY M. SWISS
London Correspondent

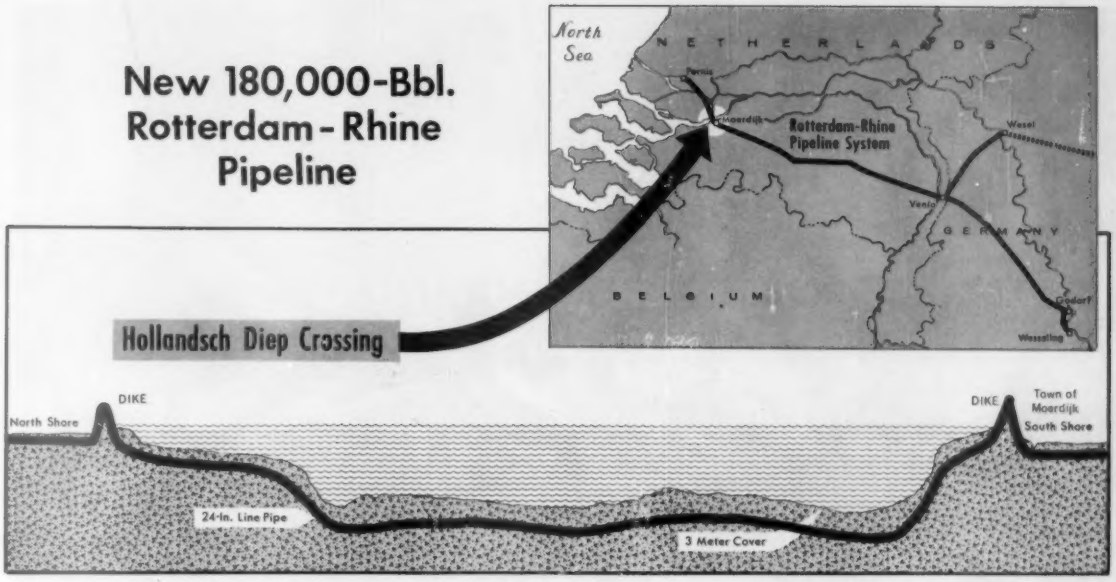
THE 183-MILE 24-in. Rotterdam-Rhine pipeline will be operating by June 5, 1960, to deliver crude oil to refineries in the Rhine-Ruhr area of Germany.

The line has been under construction since August 1958. It starts at Pernis, the port at Rotterdam, extends to Venlo, Holland, where it branches into one line to Wesel and a second to Godorf and Wesseling, Germany. The branch to Wesel connects with a 16-in. line to Gelsenkirchen. It may later be connected to the planned Marseilles-Ruhr system.

Initial capacity, with pump stations at Pernis and Venlo, will be 180,000 bbl. per day. The system will be expanded to 200,000 bbl. per day by 1963 and eventually to 400,000 bbl. per day by adding pumps at Pernis and Venlo and building two more pump stations in The Netherlands.

The new company organized to own and operate the pipeline is N. V. Rotterdam-Rijn Pijpleiding Mij., owned 40% by the Royal Dutch-Shell Group (through BPM), 20% by Caltex, and 40% by Gelsenberg & Mobil Oil

New 180,000-Bbl. Rotterdam - Rhine Pipeline



(Sales and Distribution) Co. It will supply the Dutch-Shell refinery at Godorf, Caltex at Wesseling, and Gelsenberg at Gelsenkirchen.

Capital comes from the participating companies, providing 35 million Dutch florins; a loan obtained in The Netherlands, amounting to 60 million florins; and a loan obtained in Germany, 33 million marks. The total equals 125 million florins or 35 million dollars.

Economics of the Pipeline

Even though among the countries of western Europe, West Germany is a large producer of crude oil, its 80,000 bbl. daily comes to very little in comparison with its 500,000-bbl. daily consumption. Refining in West Germany has been well below consumption, and present expansion is on a large scale.

Expansion is taking place not in or near ports but some 150 to 250 miles from the nearest major harbors of Wilhelmshaven and Rotterdam. There is in the Ruhr region ample supply of trained men and here also are the industrial consumers. Here is the hub of the steel and chemical industries which so far have relied on coal for power and raw materials. Coal production in Germany has been static for some years and the need for crude is rising. German native oil-refining firms, as well as international firms such as Esso, Caltex, Shell, and British Petroleum, have all started expanding refining facilities. New construction will soon bring West German capacity to the consumption level.

Though the Rhine is navigable up to the Swiss port of Basle and the area has excellent rail and road-transport facilities, the prospect of a large demand for crude oil in the Ruhr and Rhineland has provided stimulus for the construction of two pipelines: Wilhelmshaven-Cologne, a 28-in. line completed a year ago, and the Rotterdam-Ruhr 24-in. line.

Both pipelines start at ports which are being revamped to take tankers up to 100,000 dw. tons. Rotterdam is already one of the biggest oil ports of the world. Of its total 1957 turnover of 75 million tons, 30 million was oil. Half of this was destined in the ratio of 50,000 to 250,000 bbl. daily for Caltex and Shell's Pernis refineries, respectively, and half for the German refineries. Traffic up the Rhine is also swelled by the transportation of finished products to Switzerland and neighboring areas.

In the future the expanded port of Rotterdam will go under the name of Europort. Oil for Germany will form most of its liquid cargo, although the Caltex refinery soon will expand to 80,000 bbl. per day and Esso's, also in Pernis, will start soon.

Construction

Bechtel International Co. is engineering and construction manager of the project which is being constructed by a group of Dutch and German contractors with the help of a few American pipeliners. The project has proceeded rather deliberately, by United States standards, because of the inexperience of contractors and the adverse terrain.

Special problems. The project was aided by the support of the Dutch and German governments in acquiring rights in publicly owned areas, but acquiring rights-of-way from individuals was very tedious and expensive.

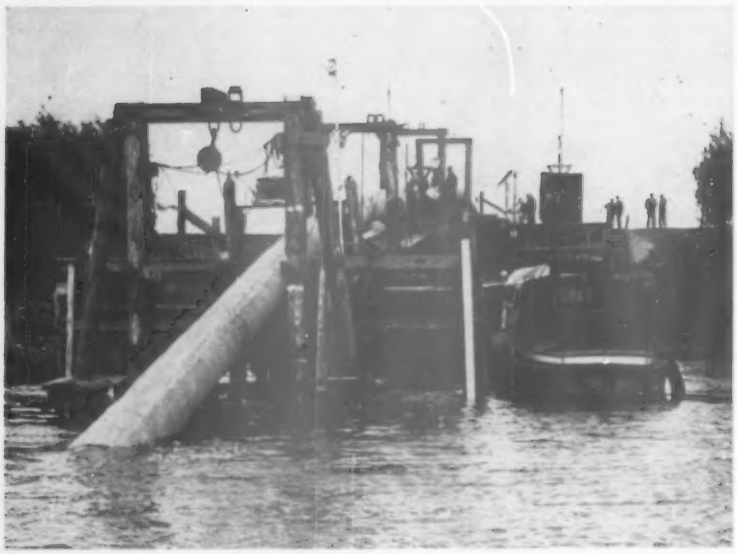
In The Netherlands, more than 1,300 property owners had to be dealt with. Compensation amounted to up to seven times the value of crops on cultivated land.

The line crosses some of the most densely populated areas of the world. Innumerable problems are met when crossing dikes, railways, roads, industrial areas, rivers, and canals. The Netherlands portion of the route traverses areas which have been reclaimed by dredging and draining. The water level in places is hardly 2 ft. below the surface of the ground, hence soil will not support heavy tractors and ditching machines. Farm land predominates on the German section, with lesser amounts of timber and several congested municipal areas, and sections where water supplies are stored only 6 ft. belowground. Timber cutting is avoided as much as possible by following roads.

Water crossings. The major source of trouble is crossing rivers and canals. The route encounters more than 100 ditches, drains, navigable canals, and rivers. Major underwater crossings in The Netherlands include the Hollandsch Diep, at 5,500 ft. the longest; Oude Maas, 2,200 ft.; Maas, 1,300 ft.; and the Vliet, Wilhelmina, and Willemsvaart canals, in which the water level is higher than the land.

In Germany the Rhine River is crossed by two submarine lines 1,700 ft. long and the Lippe Seiten Canal is crossed by a 300-ft. line.

The submarine lines are encased in concrete after welding and are winched from one shore to another and buried. The four major dikes which protect large land areas from the sea are very ticklish individual



HOLLANDSCH DIEP crossing, shown in these two photos and the drawing on the preceding page, at 5,500 ft. was the most difficult made by the line.

engineering problems. The 18 lesser dikes are bored below the base for installing a cased line and later sealing off the water.

Welding and ultrasonic testing. The line consists of 24-in. o.d by .312-in.-wall electric-weld pipe weighing 1½ tons per 40-ft. joint for the main line, with .500-in. wall being used for river crossings. Pipe was supplied by Phoenix-Rheinrorh and Mannesmann mills in Germany.

The longitudinal seam was ultrasonically tested at the mill, and in some cases X-rayed also. Mill testing consisted of subjecting the pipe to 100-atm. pressure in a hydrostatic test.

Experienced American pipeline welders run the stringer bead and hot pass and European welders run finish passes. All circumferential field welds are ultrasonically tested and, in areas where the line crossed water-supply formations, welds are double checked by X-ray.

Welded sections of line are pressured up to 90% of tensile strength and left for 24 or 48 hours. On the Holland section, only one rupture occurred, and it was traced to a defect in the material rather than to a weld.

Corrosion protection. Because of rainy weather, numerous cased crossings, and large number of bends, pipe is yard coated. The use of field coating-and-wrapping machines is not practical.

The pipe is protected with coal tar or asphalt and an outer wrap and is also cathodically protected.

Pump station. The Pernis station will be powered by three 1,750-hp. electric motors driving centrifugal pumps, with one being used as a spare. The Venlo station will have three 1,250-hp. electric motors, with one unit in reserve. The pumps will operate at about 800 psi.

A tank farm will be constructed at Venlo to provide flexibility for pumping through the 16-in. line to Gelsenkirchen.

Pump stations will be built at Eindhoven and Breda in Holland when it is desired to achieve ultimate capacity.

Protective functions. When in operation the pipeline will be automatically protected against excess pressure by alarm manometers connected to the pump discharge line and by shutting off the current automatically. Pumps are also automatically protected against sudden pressure drops.

Block valves are installed at regular intervals along the line, and at stream crossings, to isolate line breaks.

The system is designed for operation with a minimum number of personnel.

BY W. L. NELSON
Technical Editor and Petroleum Consultant

How to figure

Cost of refinery gas compression

THE COST of compressing paraffinic gases to various pressures is indicated in Table 1. The cost per million cubic feet (based on a plant for handling 10 M.M.s.c.f.d.) is $55 to $126 per day or 5.5-12.6 cents per M.c.f. when compressing to 200 psia. or 1,200 psia.

The cost of gas power is based on a gas value of 25 cents per M.s.c.f. and the use of the average of old horizonal-type gas engines and modern supercharged engines. More detail is available in Process Costimating No. 22 (Oct. 20, 1958, p. 105). Electrical motor drive costs were obtained from the same issue. The power required for compression was obtained from Process Costimating No. 24 (Aug. 25, 1958, p. 102). Compression-plant or station costs were taken as $195-$391 per horsepower (1956), and the effect of various types of equipment can be judged from Table 2.

Although gas - pipeline - transmission stations use per shift about 3 men plus about 2,37 men per 1,000 hp. (Reed and Kinney, The Oil and Gas Journal, July 13, 1959, p. 93) is was concluded that the practice in the refinery and chemical industries was nearer 2 men plus 1.5 men per 1,000 hp. In some small refineries only one man per shift is concerned with the compressors. Such practice leads to much lower labor costs than those shown in Table 1.

GAS-PROCESSING TOPICS AND CURRENT SCHEDULE

22—Oct. 20, 1958, p. 105—Cost of Refinery Power
24—Aug. 25, 1958, p. 102—Power and Cost of Gas Compression
53—Aug. 3, 1959, p. 109—Gas Recovery Plants
54—Aug. 17, 1959, p. 225—Fractionation and Gas Recovery
59—Oct. 26, 1959, p. 98—Gas Compressor Stations
63—Dec. 28, 1959, p. —Refinery Compression Plants
64—Jan. 1960, —Indication of Chemical Consumption
65—Jan. 1960 —Catalytic Cracking
66—Feb. 1960 —Oil-Company Employes
67—Feb. 1960 —Viscosity Breaking

TABLE 2—APPROXIMATE COST OF REFINERY GAS COMPRESSION PLANTS*

	$ per hp. (1946)
Reciprocating—gas engine	119-232
Reciprocating—steam engine	145-244
Reciprocating—motor	93-207
Centrifugal—motor	79-164
Centrifugal—gas turbine	79-234

*Bromberg, I., Estimate Cost of Compression Plants, Pet. Refiner, May 1958, p. 225.

TABLE 1—APPROXIMATE COST OF REFINERY OR CHEMICAL PLANT GAS COMPRESSION

Element	Unit (somewhat standard)	1956 unit cost	$/M.M.s.c.f. (in a 10 M.M.s.c.f.d. plant) 200 psia.	300 psia.	500 psia.	800 psia.	1,200 psia.	References
Labor	per shift—2+1.5/1,000 hp.†	3.12 per hour*	26.20	28.20	31.00	34.00	36.80	26, 28, 42
Supervision	per shift—0.33†	3.85 per hour*	3.05	3.05	3.05	3.05	3.05	
Maintenance	3% per year replacement	see Table 2	15-30	19-38	23-46	27-54	31-62	29
Fuel—								
200 psia. increase‡	940 hp. for 10 M.M.s.c.f.	25 ct./M.s.c.f.	4.85					22, 24
300 psia. increase‡	1,180 hp. for 10 M.M.s.c.f.			6.07				
500 psia. increase‡	1,420 hp. for 10 M.M.s.c.f.				7.30			
800 psia. increase‡	1,690 hp. for 10 M.M.s.c.f.					8.70		
1,200 psia. increase‡	1,930 hp. for 10 M.M.s.c.f.						9.95	
or Power— 200 psia. increase‡		0.8 ct./kwh	14.80					22, 24
300 psia. increase‡				18.60				
500 psia. increase‡					22.40			
800 psia. increase‡						26.60		
1,200 psia. increase‡							30.40	
Water—engine cooling	190-386x10³ B.t.u./hr.	3.0 ct./M gal.	.55	.68	.82	.97	1.11	15, 16, 38
Water—intercoolers	230-500x10³ B.t.u./hr.	1.7 ct./M gal.	.37	.49	.56	.67	.82	15, 16, 38
Total direct cost (probable extremes) per million cu. ft. per day			55-70	62-83	71-97	82-113	91-126	
Total direct cost (probable extremes) ct./M..s.c.f.			5.5- 7	6.2- 8.3	7.1- 9.7	8.2-11.3	9.1-12.6	
Obsolescence, insurance, taxes and interest (5% of replacement per year)			25-50	31-63	39-77	45-90	52-103	

*Average U. S. A. wages including 27% for all burdens, etc. †Small refiners will use fewer men and major refiners more. ‡Based on a suction pressure of 50 psia. which introduces considerable error at higher suction pressures. Note that this inaccuracy enters all of the other costs because they are related to the power required.

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Shell's first Gasification plant is a commercial success

BY A. P. VAN AMSTEL
N. V. Mij. tot Exploitatie van Kooksovengassen (Mekog)

TOWARD THE END of 1956, an oil-gasification plant was installed in Mekog Co.'s ammonia works at Ijmuiden, Holland.

Process and design. The Shell gasification process is based on the partial oxidation of any hydrocarbon, from methane to residual oil, in the presence of steam, by oxygen, by air mixed with oxygen, or by air. The continuous, noncatalytic flame-type reaction takes place in a reactor specifically developed for the purpose.

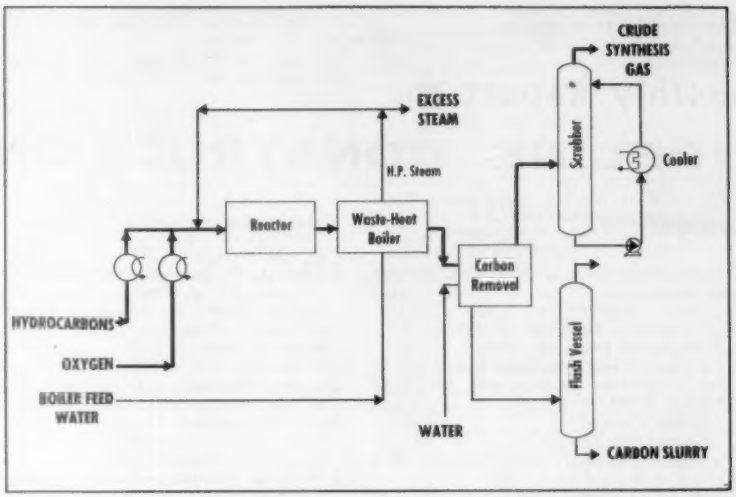
The main products are carbon monoxide (CO) and hydrogen. Small amounts of carbon dioxide (CO_2), carbon, and methane are also produced, and possibly hydrogen sulfide (H_2S) and carbonyl sulfide (COS), if there is sulfur in the feed stock.

A feature of the oil-gasification process is the high reaction temperature (approximately 2,200°-2,750° F.). The exothermic heat of reaction is utilized in a waste-heat boiler to produce steam of any desired pressure. A special feature of the Mekog boiler is that it does not require boiler-circulation water pumps. This is a real savings in energy and plant operation is more reliable.

This boiler produces about 2,300 lb. of steam per 1,000 lb. of oil gasified. About 750 lb. is used as process steam and for preheating oil and oxygen, and the excess of 1,500 lb. is piped to the general steam system.

The plant can be designed to operate at pressures that range from 75 to 600 psi. and even higher, if required. The Mekog plant was designed to oxidize 110,250 lb. of fuel oil a day at a pressure of 375 psi. This high-pressure operation has resulted in an attractive saving in compression costs for the company.

The oxygen, from an air-separation unit, is compressed by reciprocating compressors to 450 psi. and preheated to about 430° F. in coil-in-coil heaters with steam. The oxygen is then



NEW SYNTHESIS-GAS PROCESS provides for partial oxidation of any hydrocarbon to produce CO and hydrogen.

mixed with the steam required for the process and introduced into the reactor. The fuel oil is also preheated to 430° F. in a coil-in-coil steam heater before entering the reactor.

The fuel oil, oxygen, and process steam are intimately mixed in a combustor of special Shell design prior to entering the reaction zone. The reaction products pass to the waste-heat boiler where they are cooled to a few degrees above the steam temperature. The gas is then sent to the carbon-removal section where it is scrubbed and cooled to about 85° F. The gas is next processed in a COS-removal unit and H_2S wash before it enters the CO conversion unit for the production of crude hydrogen.

The plant is fully monitored by automatic controls and operated by two men per shift. Supervision is required on a part-time basis only.

Operating results. The throughput of the plant has been varied from 77,000 up to 132,000 lb. of fuel oil a day with no noticeable effect on the reactor or any other part of the unit or on the purity of the gas obtained.

Hydrocarbon oils ranging in viscosity from 800 to 3,500 seconds Redwood 1/100° F., and with sulfur content of up to 3.5% by weight, have been gasified without any difficulty.

Especially satisfactory is the very low carbon content of the gas leaving the plant. It is always less than 1 mg carbon per Nm^3 of gas.*

Typical operating data are given in Table 1.

The onstream factor for the plant was 92% in 1958, and should be increased even further in 1959.

The special refractory chosen for the reactor lining has performed extremely well and no replacement has been necessary since it was installed in 1956. The same lining will probably last for several more years.

The waste-heat boiler has required no cleaning or maintenance since the startup.

The entire gasification plant, except for the oxygen feed system, is constructed of carbon steel. Inspection of the unit after 18 months of operation showed that the wall thickness in different parts of the units was practically unchanged.

*Nm^3 = normal cubic meters.

TABLE 1—OPERATING DATA PER 2,200 LB. GASIFIED OF A TYPICAL FUEL OIL WITH A VISCOSITY OF 3,500 SECOND REDWOOD 1/100° F.

Oxygen consumption (as 100%) at 95% purity	approx. 750 Nm^3
Steam produced in waste heat boiler (at 385 psi.)	approx. 5,100 lb.
Steam used in the reactor	approx. 880 lb.
Dry water gas produced (at 85° F. and 295 psi.)	approx. 2,950 Nm^3
Average composition of water gas (in % vol. on a dry basis):	
Carbon dioxide	4.6
Carbon monoxide	47.0
Hydrogen	46.0
Methane	0.2
Nitrogen + argon	1.4
Hydrogen sulfide	0.8
Carbonyl sulfide as S	200-300 p.p.m.
Carbon content less than 1 mg./Nm^3	

Analysis feed stock, weight per cent: 84.6% C; 11.3% H, 3.5% S, 0.13% O, 0.4% N, 0.07% ash.

Example of

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New, added advantages—Less catalyst loss in fines because KAO-SPHERES don't chip as pellets do. Reduced maintenance costs, because smooth, regularly-shaped KAO-SPHERES are easier on equipment. Ask us about it.

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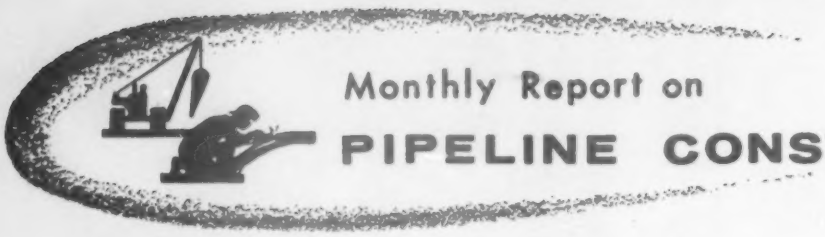

Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups —U. S., Canadian, and Foreign— and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Planned.
Completion: 1960.

• **Cooperative Refinery Association,** Kansas City, Mo.
Project: 6 miles of 6-in. at Stockton, Kans.
Status: Planned.
Completion: Spring 1960.

• **Gillette Pipeline, Inc.,** and **A. W. Hartwig, Inc.**
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

• **International Oil Pipeline Corp.,** New York City.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).
Status: Proposed.

• **Ohio Oil Co.,** Findlay, Ohio.
Project: 60 miles of 8-in. between Scipio field in Michigan and Buckeye Pipe Line Co.'s terminal south of Toledo, Ohio, and a 20-mile spur north into Pulaski and Albion fields.
Status: Under way.
Contractor: **O. R. Burden Construction Corp., Tulsa.**
Completion: January 1, 1960.

• **Standard Oil Co. of California,** San Francisco.
Project: 22 miles of 8-in. from Swanson River Unit on Kenai Peninsula to Nikiski on Cook Inlet, Alaska.
Status: Planned.
Project: 18 miles of various flow lines in Redwash field near Vernal, Utah.
Contractor: **Pease Brothers Co.,** Vernal.
Completion: December 30, 1959.

U. S. Products Pipelines

• **Humble Oil & Refining Co.,** Houston.
Project: About 34 miles of 4-in. line to move propylene from Baytown refinery to petrochemical plant at Texas City.

• **Humble Pipe Line Co.,** Houston, Tex.
Project: 27 miles of 10-in. from Baytown to Houston.
Status: Under way.
Completion: December 31, 1959.

• **Husky Oil Co.,** Cody, Wyo.
Project: About 100 miles from Cody to the Yellowstone products line west from Billings, Mont.
Status: Planned.
Completion: Late 1960.

• **Missouri - Kansas - Texas Railroad,** New York.
Project: 2,500-mile LPG system from West Texas-New Mexico area to upper Midwest. Main line would be 1,500 miles, with extensive gathering systems to connect gasoline plants in West Texas, southeastern New Mexico, and Texas Panhandle. The line from the Southwest would fork at McPherson, Kans., with one branch going to Minneapolis and the other to Madison, Wis. Size of pipe would be 10 and 12-in. with branches 6 to 8-in.
Status: Planned. Project will be started first half of 1960, possibly in February.
Completion: Fall 1960.

• **Wabash Pipe Line Co.,** Findlay, Ohio.
Project: 29 miles of 12-in. and 9 miles of 16-in. from Griffith, Ind., to Lake Calumet, Chicago, Ill.
Status: Under way.
Contractors: **Morrison Constructor Co.,** Hammond, Ind., and **Contracting & Material Co.,** Evanston, Ill.

U. S. Natural Gas Pipelines

• **Anchorage Gas Corp.,** Houston.
Project: 165 miles of line at least 12-in. in diameter from Kenai Peninsula to Anchorage.
Status: Planned. Construction may start late April or early May 1960.

• **Arkansas Industrial Pipeline Corp.** (Arkansas Louisiana Gas Co.), Shreveport, La.
Project: 130 miles of 18-in. from Perla to Helena, Ark.
Status: Planned.
Completion: 1960.

• **Arkansas Louisiana Gas Co.,** Shreveport, La.
Project: 125 miles of 18-in. from Perla to Helena, Ark.
Status: Planned.
Completion: 1960.
Project: About 58 miles of 2, 3, 4, and 6-in. line in various locations.
Status: Planned.
Completion: 1960.

• **Atlantic Seaboard Corp.,** Charleston, W. Va.
Project: 20 miles of 26 and 20-in. loop.
Status: Pending FPC approval.

• **Carolina Pipeline Co.,** Columbia, S. C.
Project: 85 miles of 8-in. in South Carolina.
Status: Pending FPC approval.

• **Central Hudson Gas & Electric Corp.,** Poughkeepsie, N. Y.
Project: About 16 miles of 10-in. from Sleightsburgh to Highland, N. Y.
Status: Planned.
Completion: November 1960.

• **Coastal States Gas Producing Co.,** Corpus Christi, Tex.
Project: 60 miles of 10-in. in La Salle and Frio counties, Texas.
Status: Planned.
Completion: June 1960.

• **Coastal Transmission Corp.,** Houston.
Project: 65 miles of 3, 4, 6, and 10-in. in Texas and Louisiana.
Status:Pending before FPC.
Completion: Summer 1960.

• **Colorado Interstate Gas Co.,** Colorado Springs, Colo.
Project: 109 miles of 26-in. from Four-Way station in Texas Panhandle, to Morton Junction in southeastern Colorado; 135 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to California.
Status: Pending FPC approval.
Completion: 1960.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Awaiting FPC approval.
Completion: 1960.

• **Colorado Oil & Gas Corp.,** Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

• **Columbia Gulf Transmission Co.,** Houston.
Project: 11 miles supply line connecting Black 17 field, East Cameron area, Louisiana.
Status: Approved.
Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various-size field lines in Acadia and Vermilion parishes, Louisiana.
Status: Approved.
Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish, Louisiana.
Status: Approved.
Project: 42 miles of 24-in. in Vermilion, Iberia, and St. Mary parishes, Louisiana.
Status: Under way.
Contractor: **Western Pipe Line, Inc.,** Austin, Tex.
Completion: December 31, 1959.

• **Consumers Power Co.,** Jackson, Mich.
Project: 121 miles of 26-in. from the Indiana-Michigan border to Northville, Mich., and 22 miles of 24-in. from Northville to Clarkston, Mich.
Status: Under way.
Contractor: **Cape Construction Co., Inc.,** Cape Girardeau, Mo.
Completion: February 15, 1960.

• **El Paso Natural Gas Co.,** El Paso, Tex.
Project: 34.2 miles of 20-in. from Puckett, Tex., to Goldsmith plant; 51.3 miles of 20-in. from Terrell to Puckett Plant discharge; and 23 miles of 20-in. from Goldsmith to Eunice-Dumas line.
Completion: January 1960.
Project: 244 miles of 30-in. Permian-San Juan Line loops.
Completion: January 1960.
Project: 87 miles of gathering lines in Bisti field in San Juan County, New Mexico.
Status: Has temporary FPC approval.

PIPELINE CONSTRUCTION

Project: 395 miles of 34-in. from Salt Lake City, to California border near Las Vegas, Nev.
Status: Pending FPC approval.
Completion: January 1, 1961.
Project: 14 miles of 16-in. to deliver gas to the Ocotillo steam-electric generating plant near Phoenix, Ariz.
Status: Under way.
Contractor: **Eastern Pipeline Contractors,** Dallas.

- **Equitable Gas Co.,** Pittsburgh, Pa.

Project: 17 miles of 16-in. in Marion and Monangalia counties, West Virginia.
Status: Pending FPC approval.
Completion: October 31, 1960.
Project: 3½ miles of 20-in. in Greene County, Pennsylvania.
Status: Pending FPC approval.
Completion: October 31, 1960.

- **Gulf Gas Co.,** San Antonio, Tex.

Project: 40 miles of 4 to 6-in. line to carry gas from Brown County, Texas, wells to Ranger in Eastland County.
Completion: Shortly after January 1, 1960.

- **Gulf Resources, Inc.,** New York.

Project: 136 miles of 14 and 20-in. from Hidalgo County to LaSalle County, Texas.
Status: Pending FPC approval.

- **Hope Natural Gas Co.,** Clarksburg, W. Va.

Project: 20 miles of 24-in. line in Wetzel and Monongalia counties, West Virginia, replacing two 16-in. lines.
Status: Approved.

- **Houston Texas Gas & Oil Corp.,** St. Petersburg, Fla.

Project: 63 miles of 2-in., 12 miles of 3-in., 80 miles of 4-in., and 34 miles of 6-in.
Status: Pending FPC approval.
Completion:1960.

- **Iron Ranges Natural Gas Co.,** St. Paul.

Project: 79 miles of 10 and 12-in. from Grand Rapids to Hoyt Lake, Minn., and 67 miles of 12-in. from Duluth to Silver Bay, Minn.
Status: Approved by FPC.
Completion: 1960.

- **Iroquois Gas Co.**

Project: 9.5 miles of 16-in. in Erie County, New York.
Status: Pending FPC approval.

- **Laclede Gas Co.,** St. Louis, Mo.

Project: 107 miles of 24-in. between Hallsville, and St. Louis, Mo.
Status: Proposed.

- **Lone Star Gas Co.,** Dallas, Tex.

Project: 36 miles of 12-in. in Eastland and Callahan counties, Texas.
Contractor: Company crews.
Completion: May 1, 1960.

- **Michigan Wisconsin Pipe Line Co.,** Detroit, Mich.

Project: 31 miles of 24-in. loop in Illinois; 17 miles of 24-in. loop in Indiana; and 18 miles of 24-in. loop in Michigan.
Status: Conditionally approved by FPC.
Completion: October 1960.
Project: 69 miles of 24, 28 miles of 20-in.; 96 miles of 16-in.; 29 miles of 8-in.; and 32 miles of 4-in. in Wisconsin.
Status: Conditionally approved by FPC.
Completion: October 1960.
Project: 65 miles of 24-in. loop in Kansas.
Status: Approved.
Completion: Summer 1960.

- **Midwestern Gas Transmission Co.,** Houston.

Project: 504 miles of 24-in. from Emerson, Man., to Marshfield, Wis., plus 54 miles of sales laterals.
Status: Approved by FPC.
Completion: 1960.

- **Mississippi River Transmission Corp.** (Mississippi River Fuel Corp.), St. Louis.

Project: 115 miles of 24-in. from near Oran in southeast Missouri, north between Ste. Genevieve and Bonne Terre into vicinity of Herculaneum and Pevely then into St. Louis County.
Status: Planned.
Completion: Last half 1960.

- **Natural Gas Pipeline Co. of America,** Chicago.

Project: 151 miles of 36-in. intermittent sections paralleling mainline facilities between Ford County, Kansas, and Joilet, Ill.
Status: Pending FPC approval.
Completion: Fall 1960.
Project: 180 miles of 24-in. between Kiowa County, Oklahoma, and Minneola, Kans.
Status: Pending FPC approval.
Completion: Fall 1960.
Project: 29 miles of 10-in. lateral from Enville and Southwest Enville fields, Love County, Oklahoma.
Status: Approved.
Completion: Tentatively December 31, 1959.
Project: 16 miles of 3, 4, and 6-in. gathering system laterals in Jack and Wise counties, Texas.
Completion: December 31, 1959.

- **Niagara Mohawk Power Corp.,** Syracuse, N. Y.

Project: 104 miles of 12-in. from Watertown, N. Y., to Massena, N. Y.
Contractor: **Fulghum Contracting Corp.,** Harrisburg, Pa.

- **Northern Natural Gas Co.,** Omaha, Neb.

Project: 217 miles of main line, 221 miles of main-line loops, and 2,178 miles of branch lines of various diameters.
Completion: 1959-60.
Project: 36.5 miles of 2 to 16-in. gathering lines at Otis gas field, Rush County, Kansas, for underground storage, and 36.7 miles of 30-in. transmission line connecting

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"Steam Jacketed" for ASPHALT TRUCK LOADING

Close-up view, above, shows 4" Barco "Jacketed" Ball Joint on asphalt loading arm. Note counterweight extension on joint. This single joint provides for 360° vertical swivel movement and 30° horizontal flexibility. (Photos: PHILLIPS PETROLEUM COMPANY, Kansas City, Kansas)

BARCO Flexible Ball Joints

Here is another of the numerous refineries that are now using Barco's new STEAM JACKETED Flexible Ball Joints in piping lines handling asphalt. Steam heat makes it possible to load trucks in a fraction of the time otherwise required. Pumping loads and strain on pipes are reduced. Messy handling conditions, use of live steam jets, and the possibility of stopped up lines are also eliminated.

Barco produces the ONLY complete line of "jacketed" flexible joints that can cope with such tough loading conditions. Users report savings running into thousands of dollars for time saved and simplification of piping requirements. These permanent, maintenance-free, labor-saving installations eliminate the problem of rapid deterioration and frequent maintenance encountered with hose.

For recommendations on how to use Barco Flexible Ball Joints, ask for a Barco engineering field representative — located in principal cities.

FEATURES

COMPLETE LINE — Barco Steam Jacketed Flexible Ball Joints are now offered in 2", 3", 4" and 6" sizes.

TO MEET YOUR NEEDS — Straight and angle; screwed and flanged styles, or welding ends. Steel casing.

FLEXIBILITY — The ball provides more than 30° total angular movement in any direction.

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ENGINEERING RECOMMENDATION — Ask for a copy of new catalog 215B on "Barco Flexible Ball Joints for Piping."

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PIPELINE CONSTRUCTION

Otis storage area to main line at Bushton, Kans.

Status: Pending FPC approval.

Project: About 21 miles of 16-in. and 26 miles of various small diameter pipeline in the Glick field, Kansas, area in Kiowa, Comanche, and Barber counties.

Status: Pending FPC approval.

Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.

Status: Proposed.

Project: 8 miles of 30-in. main line loop north of Ventura, Iowa, and 22 miles of branch lines near Marshalltown and Griswold, Iowa.

Status: Approved by FPC.

- **Ohio Oil Co.,** Findlay, Ohio.

Project: 20 miles of gathering line to move casinghead gas to proposed natural-gasoline plant in south central Michigan.

- **Pacific Gas & Electric Co.,** San Francisco.

Project: 120 miles of 34-in. looping of Topock-Milpitas main line.

Status: Planned. Pending FPC approval.

Completion: 1961.

Project: 11 miles of 20-in. from Pittsburg to Walnut Creek, Calif.

Contractor: Using company crews.

Completion: 1960.

Project: 296 miles of 36-in. from the California-Oregon border to Antioch, Calif. (This is part of the project to import natural gas from Canada, which will include the Pacific Gas Transmission project listed below.)

Status: Pending approval from governments.

Completion: 90 miles scheduled for completion in 1960, the rest in 1961.

- **Pacific Gas Transmission Co.** (Pacific Gas & Electric, San Francisco).

Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klamath Falls, Ore.

Status: Pending approval of FPC and Canadian authorities to import gas.

- **Pacific Lighting Gas Supply Co.,** Los Angeles.

Project: 116 miles of 34-in. from Needles to Newberry, Calif.

Status: Bids were to be received in mid-December 1959.

Completion: July 1, 1960.

- **Pacific Northwest Pipeline Corp.,** Salt Lake City, Utah.

Project: 18 miles of 20-in. and 40 miles of 16-in. from main line near Camas, Wash., to Salem, Ore.

Status: Pending before FPC.

Completion: 1960.

Project: 60 miles of 12-in. from Salem to Eugene, Ore.

Status: Planned.

Completion: 1960.

Project: 61 miles of 4, 6, and 8-in. gathering line in Big Piney field, Wyoming.

Status: Planned.

Completion: 1960.

Project: 9 miles of 12-in. gathering line in Red Wash field, Uintah County, Utah.

Status: Planned.

Completion: 1960.

- **Panhandle Eastern Pipe Line Co.,** Kansas City.

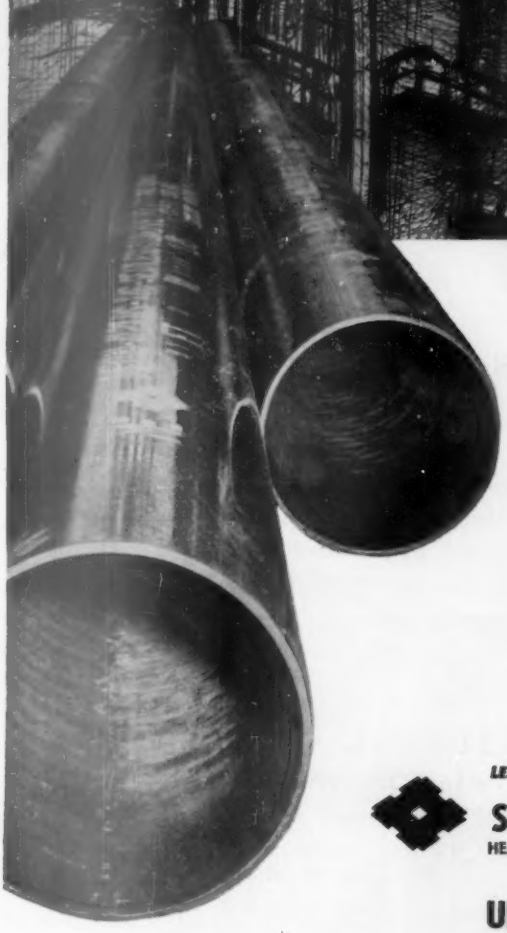
Project: 3 miles of 4-in. lateral line, and 30 miles of 4-in., 4 miles of 6-in., and 4 miles of 8-in., gathering line.

Contractor: **Hall Construction Co.**

Completion: December 31, 1959.

- **Pennsylvania Gas Co.,** Warren, Pa.

Project: 23 miles of 10-in. in Erie County, Pennsylvania, 15 miles of 8-in. in Warren and Chautauqua counties, Pennsylvania; 30



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PIPELINE CONSTRUCTION

miles of branch lines, and several small distribution lines.

Status: Approved.

• **Pioneer Natural Gas Co.,** Amarillo, Tex.

Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.

Status: Pending FPC approval.

Project: 12 miles of 10-in. from Muleshoe, Tex., northward.

Status: Pending FPC approval.

• **Public Service Co. of North Carolina,** Gastonia, N. C.

Project: About 47 miles of 4, 8, and 10-in. in North Carolina.

• **Rocky Mountain Natural Gas Co.**

Project: 65 miles of gas line in southwestern Colorado to supply Collbran, Montrose, Delta, and Orchard City.

Status: Planned.

• **Shamrock Oil & Gas Corp.,** Amarillo, Tex.

Project: 70 miles of 16-in. from Ochiltree to McKee in the Texas Panhandle, to move wet gas to a plant where liquids will be removed.

Completion: June 1, 1960.

• **South Texas Natural Gas Gathering Co.** (Coastal States Gas Producing Co., Corpus Christi, Tex.)

Project: A 60-mile line from existing system to steam generating plant in Pearsall County, Texas.

Completion: January 1960.

Project: 125 miles of 8, 10, 14, 18, and 20-in. line in Jimm Hogg County, Texas.

Status: Under way.

Contractor: **O. R. Burden Construction Corp.,** Tulsa.

• **Southern California Gas Co.,** Los Angeles.

Project: 106 miles of 36-in. and 11 miles of 34-in. from Newberry, Calif., to Placentia.

Status: Proposed.

Completion: January 1, 1961.

Project: 91 miles of 34-in. from Newberry, Calif., to Ivanpah Lake.

Status: Proposed.

Completion: January 1, 1962.

Project: 10 miles of 34-in. from Western terminal to Burbank line.

Status: Proposed.

Completion: December 1961.

• **Spur Oil Co., Houston.**

Project: 12-mile system in Hull, Tex., field.

• **Tennessee Gas Pipeline Co.**

Project: 21 miles of 16-in. gathering line from Louisiana coast to Block 46 in the Vermilion area.

Status: Pending FPC approval.

Project: 2 miles of 12-in. gathering line from Block 66 to Block 64, East Cameron area, offshore Louisiana.

Status: Pending FPC approval.

Project: 158 miles of 36-in. gas loop at various points between Kinder, La., and Centerville, Tenn.

Status: Approved by FPC.

Project: 41 miles of 30-in. loop east of Hamburg, N. Y.

Status: Pending FPC approval.

Project: 25 miles of 30-in. loop near Kane, Pa.

Status: Pending FPC approval.

• **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Miss., westerly to connect with Olin Gas Transmission Co., line in Tensas Parish, Louisiana.

Status: Approved.

• **Texas Eastern Transmission Corp.,** Shreveport, La.

Project: 22 miles of 14-in. from Rayne field, to Opelousas, La.

Status: Under way.

Project: 81 miles of 24-in. from Tamarack, to Perulack, Pa.

Status: Pending FPC approval.

Project: 40 miles of 36-in. from Lambertville, to Linden, N. J.

Status: Pending FPC approval.

Project: 23 miles of 20-in. from Eagle, to Chester Junction, Pa.

Status: Pending FPC approval.

Project: 4 miles of 30-in. from Linden, to Staten Island, N. J.

Status: Pending FPC approval.

Project: 65 miles of 30-in. from Perulack, Pa., to Lambertville, N. J.

Status: Pending FPC approval.

• **Texas Electric Service Co.,** Fort Worth, Tex.

Project: 200-mile 22 or 24-in. line from Old Ocean field, Brazoria County, Texas, to Fort Worth, and 70-mile 16-in. line from there to Graham, Tex.

Status: Planned.

• **Texas Illinois Natural Gas Pipeline Co.,** Chicago.

Project: 371 miles of 30-in. loop of present system between Texas and Chicago.

Status: Pending FPC approval.

Completion: 1960.

Project: 10.6 miles of 8-in. line in Starr and Hidalgo counties, Texas.

Status: Pending FPC approval.

• **Transcontinental Gas Pipe Line Corp.,** Houston, Tex.

Project: 69 miles of 30-in., 211 miles of 36-in., and 7 miles of 16-in. in various states.

Status: Pending FPC approval.

Completion: 1960.

Project: 83 miles of 30-in. and 152 miles of 36-in. in various states.

Contractors: **Williams Brothers Co.,** Tulsa, has contract for 23 miles of 30-in. near DeQuincy, La.; and **Panama-Williams Corp.,** Houston, has contract for 15 miles of 30-in. near Houston.

Status: Under way on 30-in. line.

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PIPELINE CONSTRUCTION

Completion: 1960.

Project: 13 miles of 24-in. and 40 miles of 8 to 20-in. Louisiana purchase laterals.

Status: Approved by FPC.

Completion: 1960.

• **Transwestern Pipeline Co.,** Houston.

Project: 490 miles of 24 and 20-in. from Texas to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz., near the California border. Also, 300 miles of 10, 12, and 16-in. lateral lines in Texas and New Mexico.

Status: Under way.

Contractors: **Houston Contracting Co.,** Houston, and **H. C. Price Co.,** Bartlesville, Okla., have joint contract to build the main line. Houston Contracting will build 149 miles of 30-in. from Corona, N. M., west to McCartys, N. M.; 55 miles of 30 and 89 miles of 24-in. from Corona east to Roswell and southeast to Carlsbad; 61 miles of 20 and 76 miles of 24-in. from Fort Stockton, Tex., to Carlsbad; and 166 miles of 24-in. from Roswell northeast to Dawn, Tex. Price will handle two main-line spreads totaling 335 miles in Arizona. As for the 300 miles of laterals, Houston Contracting will carry out this work with **R. H. Fulton & Co.,** Lubbock, Tex., and **Western Pipe Line, Inc.,** Austin, Tex. Western will build 100 miles of 10, 12, and 16-in. in West Texas and New Mexico.

Completion: June 1960.

Project: 300 miles of 4, 6, and 8-in. gathering lines in the Texas Panhandle, northwestern Oklahoma, Southwest Texas, and southeastern New Mexico. This project is in conjunction with the 1,160-mile Texas-California line (see above).

Contractor: **Sheehan Pipe Line Construction Co., Tulsa.**

• **Trunkline Gas Co.,** Houston, Tex.

Project: 24.5 miles of 12-in. gathering line from Lowry, to Cameron Parish shoreline, Louisiana.

Status: Under way.

Contractor: **Sam Carline, Inc.,** Berwick, La.

Project: 42 miles of 24-in. loop from west of Moss Hill, to Silsbee, Tex.

Status: Under way.

Contractor: **Sharman, Allen, Gay & Taylor, Inc.,** Houston.

Project: 53 miles of 30-in. loop from Pitkin, to Pollock, La.

Status: Under way.

Contractor: **Grayco Constructors, Inc.,** Austin, Tex.

Project: 61 miles of 30-in. loop from Pollock, to Riverton, La.

Status: Under way.

Contractor: **APV Co., Inc.**

Project: 177 miles of 30-in. loops in Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.

Status: Under way.

Contractor: **Panama, Inc., Houston.**

Project: 62 miles of 26-in. extension from Bourbon to Rossville, Ill.

Status: Under way.

Contractor: **Contracting & Material Co.,** Evanston, Ill.

Project: 137 miles of 26-in. extension from Rossville, Ill., to Vistula, Ind.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.,** San Francisco, Calif.; **Bechtel Corp.,** San Francisco, has the double-jointing contract.

• **United Fuel Gas Co.,** Charleston, W. Va.

Project: About 5 miles of 16-in. transmission line near Huntington, W. Va.

Status: Approved by FPC.

• **United Gas Pipe Line Co.,** Shreveport, La.

Project: 14 miles of 12-in. to connect North Henderson field area, Rusk County, Texas.

Status: Approved by FPC.

Project: 20 miles of 16-in lateral in Louisiana.

Status: Approved by FPC.

Project: 8.7 miles of 30-in. line paralleling part of existing line from Agua Dulce field, Texas, which will be submerged by flood-control program.

Status: Approved by FPC.

Project: 27 miles of 20-in. and three 12-in. Mississippi River crossings near Empire, south of New Orleans, La.

Status: Under way.

Contractor: **Houston Contracting Co.**

• **Valley Gas Transmission, Inc.** (Fish Engineering Corp.), Houston.

Project: 150 to 160 miles of 3 to 6-in. gathering lines to tap fields in Starr, Hidalgo, Brooks, and Jim Wells counties, Tex.

Status: Pending FPC approval.

Canadian Crude Oil Pipelines

• **Act Oils, Ltd.**

Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.

Status: Pending British Columbia Government approval.

• **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)

Project: A 250-mile line from Athabasca oil sands in northeastern Alberta to Edmonton.

Status: Proposed.

Completion: 1960.

• **Independent Pipe Line Co.** (Home Oil Co.), Calgary.

Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles

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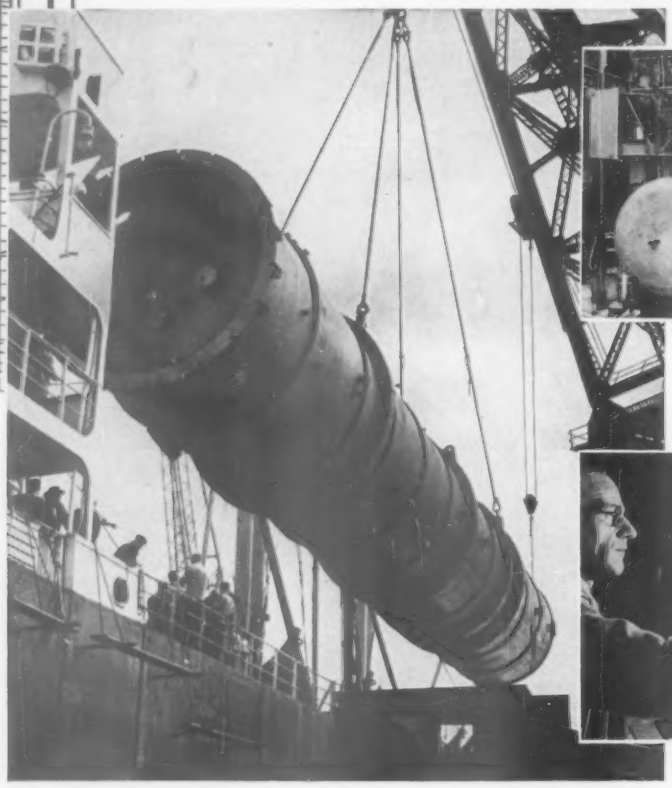

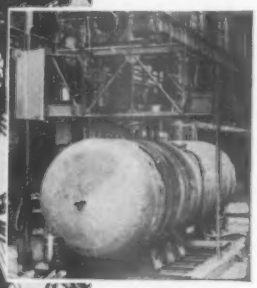

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of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake, Alta., on the 36-in. line.

Status: Proposed.

- **Mid-Continent Pipe Lines, Ltd.,** Edmonton, Alta.

Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Saskatchewan, North Dakota, Minnesota, Wisconsin, and Illinois. U .S. section to be owned by International Oil Pipeline Corp., New York City.

Status: Pending Canadian Board of Transport Commission approval. W. C. Gilman & Co., New York City, has made preliminary study.

- **Peace River Oil Pipe Line Co., Ltd.,** Calgary, Alta.

Project: 233 miles of 8-in. to move crude from the Milligan Creek area of British Columbia to Trans Mountain Pipe Line in Alberta. The new line will connect with the Peace River system near Valleyview, Alta.

Status: To get under way early in 1960.

Completion: Possibly in the fall 1960.

Project: 130-mile 12-in. line from Virginia Hills through Windfall to the main line linking with Trans Mountain Pipe Line in Alberta.

Status: Pending government approval.

Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alberta.

Status: Approved.

- **Rangeland Pipe Line Co.,** Calgary.

Project: 111-mile line from Cessford field to Calgary.

Status: Pending approval of Alberta government.

- **Trans-Prairie Pipelines, Ltd.,** Edmonton, Alta.

Project: 6-8-in. line from Weyburn field to Regina and Moose Jaw, Sask.

Status: Proposed.

Canadian Products Pipelines

- **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.

Project: Gathering system to connect Alberta gasoline plants to trunk line from Alberta to Pacific Coast.

Status: Proposed.

Project: A line to carry sulfur, propane, and butane from the Calgary, Alta., area to Milwaukee.

Status: Under study.

- **Hydrocarbons Pipeline Co.,** Winnipeg, Man.

Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.

Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.

Contractor: **Dutton - Williams Brothers, Ltd., Calgary,** and **A. D. Little Co., Boston,** are consultants.

- **Pembina Pipe Line, Ltd.,** Edmonton, Alta.

Project: A 1,200-mile line to carry sulfur, LPG, and natural gasoline from Alberta's gas fields to eastern Canada.

Status: Proposed.

Canadian Natural Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.,** Calgary.

Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral. Main line is from Berland River, Alta., to Crows Nest Pass.

Status: Approved by Alberta government. Work to start at the beginning of the 1960 construction season. Line may be in operation by the end of 1961.

- **Alberta Natural Gas Co., Ltd.** (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary).

Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.

Status: Pending approval of Canadian and U. S.regulatory agencies.

- **British Columbia Electric Co.,** Vancouver.

Project: 35 miles of 30-in. from Huntington, B. C., to Vancouver.

Completion: 1960.

- **Cartier Gas Corp.** (St. Maurice Gas, Inc. and Consumers' Gas Co., Toronto).

Project: 170 miles from Montreal to Quebec City.

Status: Proposed.

- **Northern Natural Gas Co., Omaha.**

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.

Status: Planned.

Project: 32 miles of 24-in. from Pincher Creek to Montana border to tie in with planned U. S. line on to Minneapolis.

Status: Planned.

- **Trans-Canada Pipe Lines, Ltd.,** Toronto.

Project: 74 miles of 34-in. main-line loop (Burstall to Winnipeg, Man.) and 51-mile 30-in. lateral from Emerson, Man., to U. S. border near Noyes, Minn., to connect with proposed Midwestern system now before U. S. FPC.

Status: Pending government approval.

Completion: Fall 1960.

Project: An additional 390 miles of 34-in.

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PIPELINE CONSTRUCTION

main-line loop between Burstall and Winnipeg, Man.

Status: Planned. About 268 miles scheduled for construction in 1961, and 122 miles in 1962.

- **Van Tor Oil & Exploration Co.**, Vancouver, B. C.

Project: Line from British Columbia mainland to Vancouver Island.

Status: Proposed.

Completion: 1960.

- **Westcoast Transmission Co., Ltd.**, Calgary.

Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Project: 250 miles of 30-in. from Taylor to Fort Nelson, B. C.

Status: Planned.

Foreign Crude Oil Pipelines

- **Arab Pipeline.**

Project: 1,250-mile pipeline from the Persian Gulf to Mediterranean serving fields in Saudi Arabia, Kuwait, Iran, Iraq, and Syria.

Status: Proposed by Saudi Arabian Government as project of Arab countries, and approved by the Arab League's petroleum department.

- **Arabian American Oil Co.**, Dhahran, Saudi Arabia and N. Y. C.

Project: 18 miles of 34, 36-in. from Qatif to Ras Tanura.

Status: Planned.

Contractor: Company personnel.

Completion: July 1, 1962.

Project: 6 miles of 30-in. from Ras Tanura to Ras Tanura terminal; 4 miles of 14-in. from Buqqa to QA-2 pipeline.

Status: Planned.

Contractor: Company personnel.

Completion: October 1, 1960.

- **Barnabos Group** (Italian interests).

Project: A line from Venice, Italy, to Innsbruck, Austria, which could then be extended to Munich, Germany.

Status: Planned.

- **Basrah Petroleum Co.**

Project: 65 miles of 30 and 32-in. from Zubair to Fao in southern Iraq.

Contractor: **Turriff-Burden, Ltd., Tulsa.**

Completion: 1961.

- **Bolivia-Paraguay.**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.

Status: Planned.

- **Cie. des Transports par Pipe-Lines au Sahara** (subsidiary of Cie. de Recherches et d'Exploitation de Petrole au Sahara), Paris.

Project: 470 miles of 24-in. from Edjele fields in Sahara to the Tunisian Mediterranean Coast.

Contractors: **Groupement des Societes Entrepose et Parisienne pour l'Industrie Electrique en vue de l'Etude et de la Construction de Pipe-Lines,** and **Ste. des Grands Travaux de Marseille.** Engineering firm on the job is **Bechtel Mediterraneenne** S. A. (subsidiary of **Bechtel Corp.,** San Francisco).

Completion: End of September 1960.

- **Creole Petroleum Corp.**, Caracas, Venezuela.

Project: About 8 miles of 12, 20, and 24-in. gathering line in Lake Maracaibo.

Status: Planned.

Completion: December 1960.

- **Eastern Block Council for Mutual Economic Aid.**

Project: 2,500-mile "Vomecon" pipeline from the Volga-Ural oil fields in Russia to East Germany, Poland, Czechoslovakia, and Hungary. The system will originate at Kuybyshev on the Volga River and will split into two branches at the Dneiper River, one going to Poland and Germany, the other to Czechoslovakia and Hungary. Expected capacity, 300,000 bbl. daily.

Status: Construction under way in Czechoslovakia, with completion of this section by early 1961.

- **Elburz Oil Corp.**

Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.

Status: Planned.

- **Empresa Nacional de Petroleo,** Chilean Government company.

Project: 35-mile 8-in. outlet for fields in the Punta Delgada area of Magallanes Province.

Status: Under way.

Completion: March 1960.

- **ENI (Italian state oil agency)** and **Italo-Swiss Finance Co.**

Project: A 700-mile system from Genoa to Aigle, Switzerland, thence northeast to the German border, where it would split with one branch going to Munich and another branch to the Karlsruhe area. Feeder lines would go to Turin, Milan, and Cremona, Italy.

Status: The trunk line from Genoa to Aigle has been approved by the Italian Government.

- **Iranian Oil Participants, Ltd.**

Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.

Status: Planned.

Project: 99 miles of 26, 28, and 30-in. from Gach Saran field to new terminal at Kharg Island in the Perisan Gulf.

Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Bros. Co.,**

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PIPELINE CONSTRUCTION

Tulsa, **Richard Costain, Ltd.,** and **John Brown, Ltd.,** London, and **Werkspoor & Bredoro,** The Netherlands.

- **Iraq Petroleum Co.,** London.

Project: 65 miles of 30-in. in southern Iraq between Rumaila and Fao.

Contractor: **Turriff-Burden, Ltd.,** Tulsa.

Project: 20 miles of 30-in. from the Lebanon-Syrian border to Tripoli.

Contractor: **Contracting & Trading Co.,** Beirut, Lebanon.

Completion: April 1960.

Project: 250 miles of 30 and 32-in. in northern Iraq from Kirkuk to the Syrian border.

Contractor: **Turriff-Burden, Ltd.,** Tulsa.

Status: Under way.

Completion: 1961.

- **Israel Government.**

Project: 16-in. loop of 8-in. line on 235-mile Gulf of Aqaba-Haifa system.

Status: Proposed.

Project: Replace 125 miles of 8-in. from Elath to Beersheba with 16-in.

Status: Under way.

Completion: Mid-1960.

- **Libya.**

Projects: Several companies have been studying the possibility of building pipelines to move crude from newly discovered fields in Libya to the Mediterranean Coast. These include the Conorada Group, Jersey Standard, and Caltex.

- **Oil India Private Ltd.** (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government one-third).

Project: 720 miles of line in northeast India. This would include 260 miles of 16-in. from Nahorkatiya to Noonmati (site of proposed refinery), and 460 miles of 14-in. from Noonmati to Barauni (site of another proposed refinery).

Status: Deadline on bidding is January 7, 1960.

Completion: 1962.

- **Pan American International Oil Co.,** New York.

Project: 84-mile 12 to 14-in. line from Comodoro Rivadavia field to Argentina's Atlantic Coast.

Status: Under way.

Completion: February 1960.

- **Petroleo Brasileiro S. A. (Brazil).**

Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.

Contractor: **Techint, Inc.,** Milan, Italy.

Project: 70 miles of 22-in. from Sao Sebastiao to Cubatao.

Status: Pending approval.

Contractor: **Techint, Inc.,** Milan, Italy.

Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.

Status: Planned.

- **Rotterdam-Rhine Pipeline Co.** (Caltex Petroleum Mij., Bataafsche Petroleum Mij., Gelsenberg Benzin, A. G., and Mobil A. G.)

Project: 59 miles of 30-in. and 96 miles of 24-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf and Wesseling, and a 25-mile branch to Wessel to serve the refinery in Gelsenkuchen.

Status: Under way.

Contractor: **Bechtel International Co.,** is project manager. **Associated Pipe Line Contractors** has most of construction. German and Dutch firms have 33 miles of 24-in. in south Holland and four major submarine crossings.

Completion: Mid-1960.

- **Royal Dutch-Shell.**

Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.

Status: Planned.

Contractor: **Williams Brothers Overseas,**

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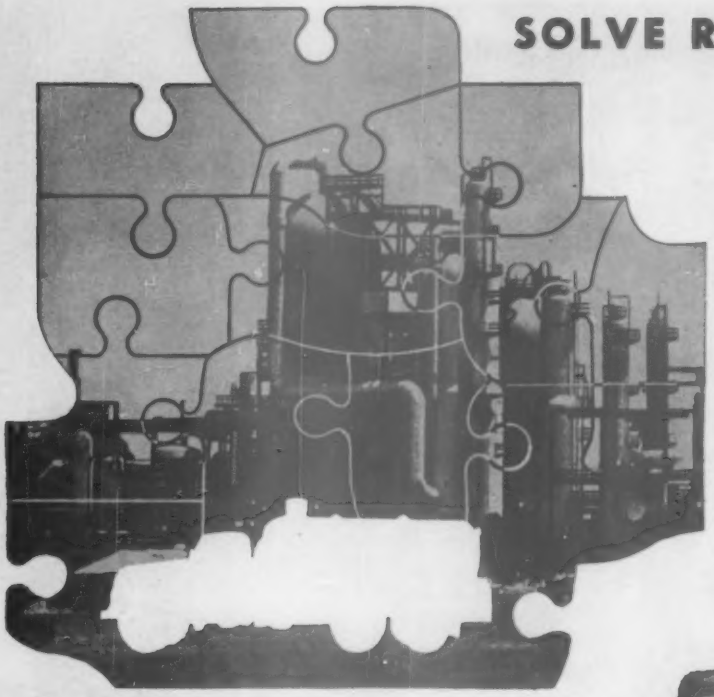

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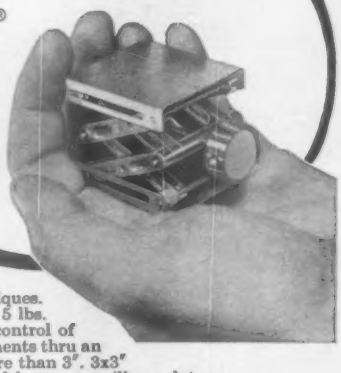

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PIPELINE CONSTRUCTION

Ltd., Tulsa, and **John Brown, Ltd.,** London.
Completion: January 1, 1962.

- **South European Pipeline Co.** (Jersey Standard, Caltex, and 14 other firms).
Project: 419 mile 30-in. line from Lavers, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany.
Status: Construction to get under way by January 1961.
Completion: 1962.

- **Superior Oil Co.,** Los Angeles.
Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.
Status: Planned.
Contractor: **Pipe Line Technologists, C.A.,** Maracaibo, has design.

- **Syrian Pipeline,** Damascus.
Project: 500-mile line from Karshuk field, Syria, to Mediterranean.
Status: Proposed.

- **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.
(See Eastern Block for information on new East Europe line).

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blancha on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

- **Yacimientos Petroliferos Fiscales Bolivianos,** La Paz.
Project: 407-mile 12-in. line from Camiri to Sica Sica.
Status: Planned.

Foreign Products Pipelines

- **Estrada Ferroviaria Santos a Jundiai,** Sao Paulo, Brazil.
Project: 25 miles of 6-in. ethylene line from Cubatao to Rio Grande.
Status: Pending approval.
Contractor: **Techint, Inc.,** Milan, Italy.

- **National Iranian Oil Co.,** Teheran.
Project: 510 miles of 8-in. eastward from Teheran to Meshed, Iran.
Status: Planned.
Contractor: **Williams Brothers,** Tulsa, has contract for about half this project.

- **North Atlantic Treaty Organization** (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington).
Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Status: Planned.
Project: 93 miles of 6-in. in Turkey.
Status: Bids requested in June 1959.

- **Petroleos Mexicanos.**
Project: 213 miles of 10-in. from Monterrey to Torreon.
Status: Under way.
Contractor: **Inde-Protexa.**
Completion: March 1960.
Project: 291 miles of 8-in. from Torreon to Chihuahua.
Status: Planned.
Completion: March 1961.

- **Pipelines of Puerto Rico,** San Juan.
Project: 95 mile 8-in. line from Commonwealth Oil refinery at Penuelas to Catano in the vicinity of San Juan.
Status: Approved by Puerto Rican Public Service Commission.

- **Syrian Pipeline.**
Project: About 310 miles from a new refinery at Homs to tank farms in the Damascus, Aleppo, and Latakia areas.
Status: Deadline for bids is February 29, 1960.

- **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.
Status: Under way.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

MR. SUPERINTENDENT

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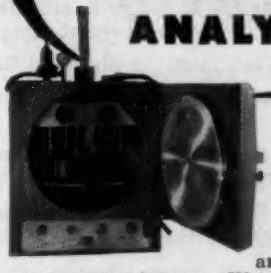

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PIPELINE CONSTRUCTION

Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

Foreign Natural Gas Pipelines

- **Attock Oil Co., Ltd.,** London.

Project: 35 miles of 6-in. from Fenchu Hanj to Wah, Pakistan. Spread office is in Rawalpindi.
Contractor: **Contracting & Trading Co.,** Beirut, Lebanon.
Completion: February 1960.

- **Creole Petroleum Corp.,** Caracas, Venezuela.

Project: 17 miles of 30-in. and about 5 miles of 16, 20, and 24-in. from Lake Maracaibo flow stations to conservation plant Bachaquero 1.
Status: Planned.
Completion: September 1960.
Project: 22 miles of 12-in. from conservation plant Bachaquero 1 at Lake Maracaibo to conservation plant Tia Juana 2.
Status: Planned.
Completion: June 1960.

- **French Government,** Paris.

Project: 400-mile big-inch gas line from Hassi R'Mel field to power plant at Bone, Algeria.
Status: Planned.

- **Pakistan Petroleum Co.**

Project: 145 miles of 8-in. high-pressure line from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

- **Petroleos Mexicanos.**

Project: 483 miles of 24-in. from Jose Colomo field in State of Tabasco to Mexico City.
Status: Under way.
Contractors: **Condusa** is contractor. Contracts for eight river crossings on the projects were awarded to **Collins Construction Co.,** Port Lavaca, Tex., and **Constructora Inde S. A. de C. V.,** Mexico City.
Completion: November 1960.
Project: 200 miles of 14-in. from Mexico City to Salamanca.
Status: Planned.
Completion: September 1961.
Project: 291 miles of 12-in. from Torreon to Chihuahua.
Status: Planned.
Completion: March 1961.
Project: 213 miles of 16-in. from Monterrey to Torreon.
Status: Under way.
Contractor: **Inde-Protexa.**
Completion: March 1960.

- **Standard-Vacuum Oil Co.,** New York.

Project: 60 miles of 8-in. from Radja field to proposed ammonia plant near Palembang, Sumatra.
Status: Planned.
Completion: Ammonia plant is scheduled for completion in 1962.

- **Sui Gas Transmission Co.,** Multan, Punjab, India.

Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan line. Extension will terminate at Lyallpur.
Status: Under way.

- **Union of Soviet Socialist Republic.**

Project: A 465-mile line from Karadag near Baku to Tbilisi and Erevan.
Status: Under way.
Completion: 1960.
Project: A 127-mile line across the Turkmenian Desert from Kizyl-Kum to the Caspian Sea port of Krasnovodsk.
Status: Under way.
Project: Two parallel lines, each over 1,200 miles long, from Gazly, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Proposed.
Project: Line from Samarkand, through Tashkent to Chimkent, Dzhambul, Frunze, and Alma-Ata near the border.
Completion: Line from Samarkand to Tashkent expected to be finished in 1960. Completion of rest of line expected in 1965.
Project: Line from Sverdlovsk to Omsk, Kemerovo and Tomsk.
Status: Proposed.
Project: Line from Berezovo field to Sverdlovsk.
Status: Proposed.
Project: Line from Stalingrad to Gorky and to Moscow.
Status: Proposed.
Project: Line from Dzhebol field to Izhevsk and to Sverdlovsk.
Status: Proposed.
Project: Line from Gorky to Kaman.
Status: Under way.
Project: Line from Saratov to Sverdlovsk, with branches into Stepanovskoe field.
Status: Proposed.
Project: Line from Kanevskoe (Kraansnedar) field to Sulkhumi.
Status: Proposed.

- **Venezuelan Atlantic Transmission Corp.,** Caracas.

Project: 10 miles of 16-in. loop from La Yaguara to Tacagua Junction.
Contractor: **William Brothers Co.,** Tulsa.
Completion: March 20, 1960.

- **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: Line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26-in. to the connecting point for the Plaza Huincul link and 30-in. from the connection to Buenos Aires.

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- **SAFE:** Sling has no humps or projections to dig into surface of coated pipe.
- **THIN:** Only 5/8" thick. Ideally suited for narrow ditches.
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- **UNFASTENS EASILY:** Especially designed sling iron permits quick — easy, fastening and unfastening after pipe is in the ground.

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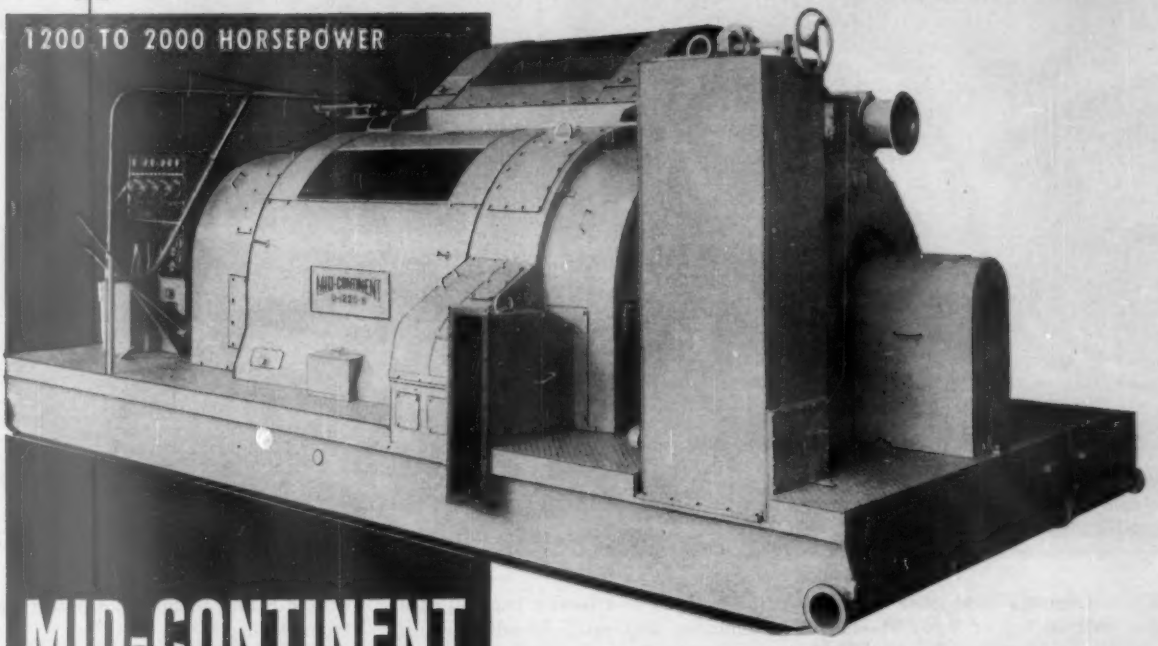

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- **THREE FORWARD SPEEDS** to the rotary, catshaft, and optional sandreel — one reverse speed.
- **EXTRA LARGE BALANCED DRUM** — 32¼" diameter by 57" long barrel.
- **FAWICK VENTORQUE 42VC1200** hi- and lo-drum clutches.
- **DOUBLE ADJUSTMENT MAIN BRAKES** are fully equalized with 60" by 10¾" water circulating rims of roll forged alloy steel.
- **UNITIZED CONTROLS** conveniently located in a single console for greater operational efficiency.
- **GREASE LUBRICATED BEARINGS** with flood lubrication provided for chains, sprockets, and splined clutches.
- **TWO-SECTION CONSTRUCTION** to simplify rig-up and moving.

DWS-9

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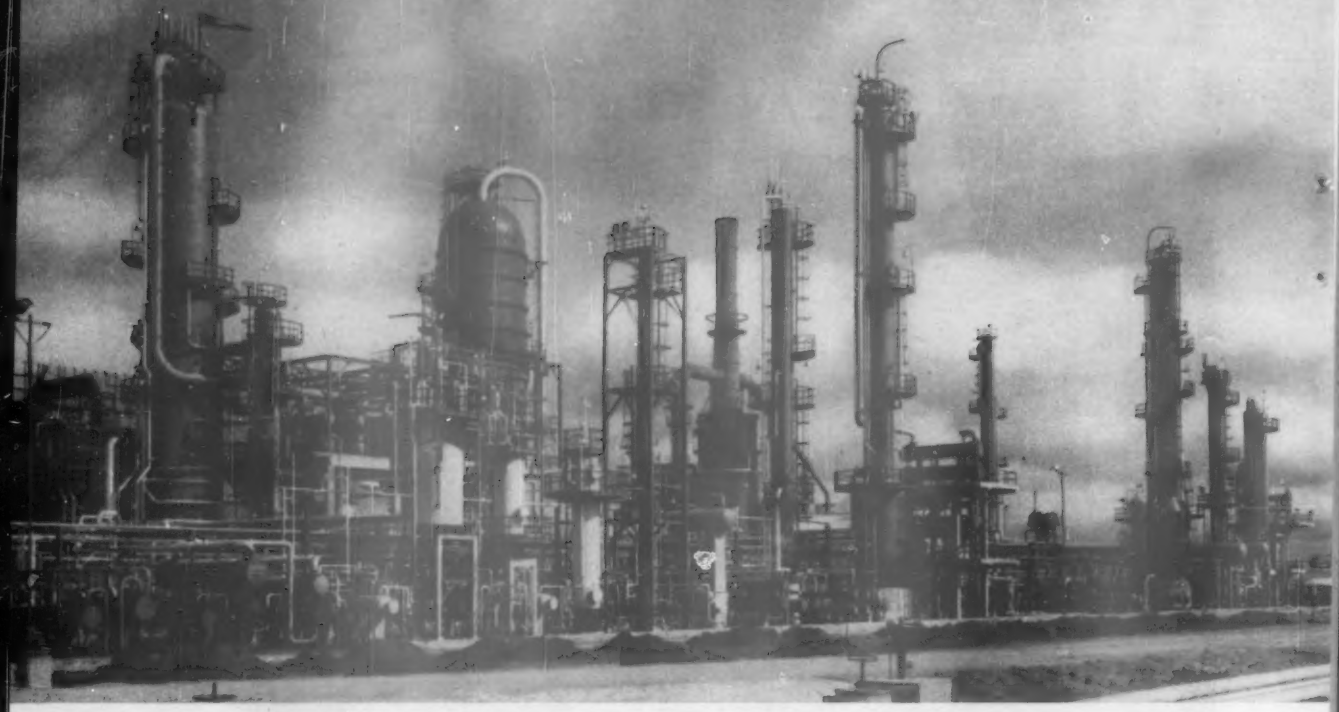

When Lummus completed construction this spring of Esso Standard's new Bordeaux refinery, it added 31,500 barrels per calendar day to France's refining capacity. The new Bordeaux installation is also the first refinery designed and built to operate on French crude. Crude flows through a 12" pipeline from Esso-REP's Parentis field south of Bordeaux.

In recent years *existing* refineries in France have expanded greatly. The new Bordeaux refinery, on the other hand, is a "grass roots" refinery – the second built in France since World War II–and Lummus has handled the engineering and construction of both.

Although the refinery will operate at 31,500 barrels per day initially, facilities are designed to permit expansion to a 45,800 B/D throughput at minimum cost.

The refinery's design permits production of LPG, motor gasolines, jet fuels, kerosene, diesel fuels, heating oils, light and heavy fuel oil, and asphalts. Automatic blending equipment has been included to produce the various grades of asphalt required for the French market.

The Bordeaux refinery uses Esso Research and Engineering's "Hydro-Skimming" processing plan, which consists of atmospheric and vacuum distillation, with Hydrofining and Powerforming to produce the required gasolines. Light ends and treating sections are also included for both the pipestill and Powerformer.

In addition to product shipping facilities, Lummus also provided complete auxiliary and off-site facilities, including storage tanks, steam generation, cooling water, electric power, and air – plus the necessary piping, transfer pumping and TEL blending.

The Bordeaux project was handled by Lummus' French company, Societé Française des Techniques Lummus, with specialists from Lummus in the United States teaming up with those from Paris.

For design, engineering and construction of refineries anywhere in the world, contact one of the eight Lummus offices – and draw on more than 50 years' experience on over 800 major installations.

On the unusual heater exhaust system shown above, all vertical heaters exhaust into diagonal flues which feed one central stack.

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▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .

Engineering problems solved fast

. . . with this new transistorized general-purpose digital computer now available. The RPC-4000 can handle both engineering and business problems. It is capable of operating on nine-digit numbers at rates up to 240,000 operations a minute.

Switches allow information to be locked in the main memory in increments of 1,024 words, so that it cannot be altered by program or operator error. As many as 17 input - output devices may be connected on line. The marker's standard input-output equipment for the computer is a tape typewriter system that includes a typewriter, desk, tape punch-read console, and chair. Basic reader speed is 60 characters a second. The RPC-4000 computer will be available at a monthly rental of $1,750 or a total sales price of $87,000. Source: **Royal McBee Corp. Data Processing Div., Port Chester, N. Y.**

Faster calculations

. . . in engineering are possible with the new IBM 1620 computer that is only slightly larger than the average desk or drafting table. It will do more than 100,000 calculations a minute. It can perform complex engineering computations on a continuous or production basis. It is particularly adaptable to such problems as oil-pipeline transmission, product inventory, petroleum-blend evaluation, and power-requirement analysis.

Features include 20,000 digits of magnetic-core storage. The computer is to be available in late 1960. It is to sell for about $74,000 and rent for about $1,600 a month. Source: **Data Processing Div., IBM Corp., 112 East Post Road, White Plains, N. Y.**

●

Fastener seal

. . . of stainless steel can now be obtained for bolts, studs, and other fasteners and fittings. The seal, called Stat-O-Seal, can be obtained for noncorrosive applications out of stainless steel in all standard sizes except —6 and —8.

An advantage of the seal is that it is under controlled confinement with full metal-to-metal contact of facing surfaces to assure a positive seal at low or high pressure or vacuum. Outside diameters range from 0.406 to 1.621 in. Inside diameters range from 0.159 to 1.055 in. Thickness is 0.050 in. The seals are available for immediate delivery. Source: **Parker Seal Co., 10567 Jefferson Boulevard, Culver City, Calif.**

Fuel changed

. . . without adjustments on this new diesel engine. Resulting from intensive research into combustion chamber configuration and metallurgy, this Hercules diesel permits the use of a wide variety of fuels. These include diesel oil, kerosine, jet fuel, and gasoline. To achieve this feature, a special alloy insert is used in the combustion chamber.

Though designed primarily for trucks, the engines are expected to prove valuable for other industrial applications and as replacements for gasoline engines in trucks. They range in size from 50 to 350 hp. in three, four, six, and eight-cylinder models.

The diesels for light and medium trucks range from 50 to 180 hp. As an example of price, a 115-hp., six-cylinder, 3,000 r.p.m. engine carries a distributor list price of $1,490. Distributor list price for a 50-hp. three-cylinder engine is $950. Source: **Hercules Motors Corp., 101 Eleventh Street, S. E., Canton 2, Ohio.**

Want more facts about equipment or copies of product literature described in this issue?

Send this **Showcase Coupon**

to manufacturer at address shown in bold type after each item.

Product name, Model no., literature title or number: .....

.....

Described in OIL AND GAS **JOURNAL** - Issue of December 28, 1959

NAME..... TITLE.....

COMPANY.....

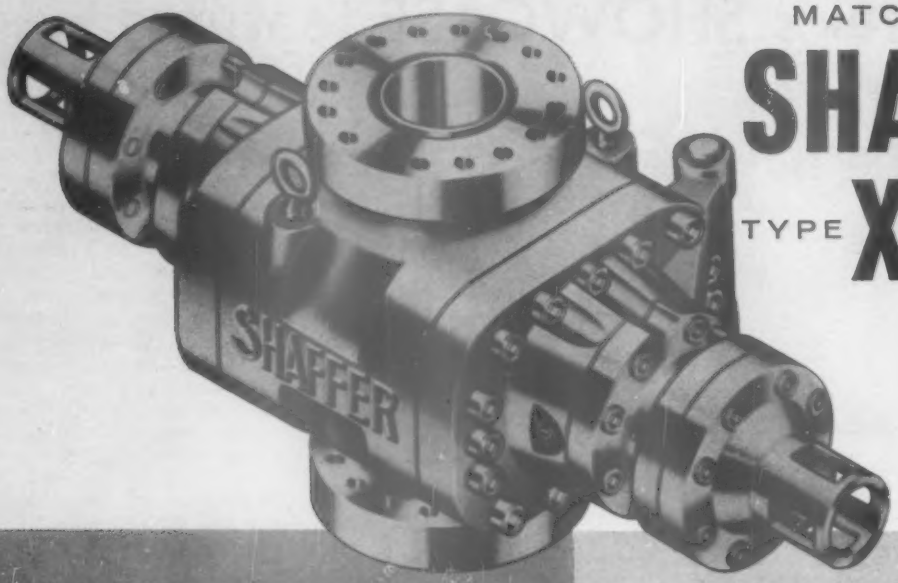
ADDRESS.....

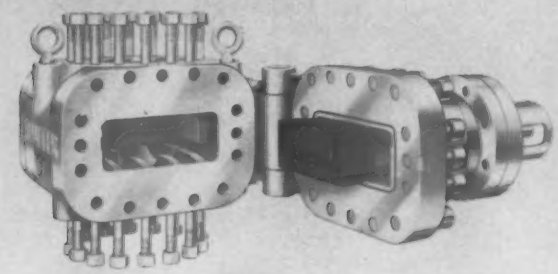
CITY..... STATE.....

NOTHING in Blowout Preventers

MATCHES THE

SHAFFER TYPE XHP





THERE'S FAR MORE to building a high pressure blowout preventer than just meeting a pressure rating. But if pressure rating is your first consideration, take a look at the kind of *extra high* pressures the Type XHP can handle . . .

- **7-1/16" Bore Size—22,500 PSI Test Pressure, 15,000 PSI Working Pressure!**
- **9" and 11" Bore Sizes—15,000 PSI Test Pressure, 10,000 PSI Working Pressure!**

But That's Only Part of the XHP Story.

Although it has an extra high pressure rating, the Type XHP is not clumsy to service nor cluttered in its design.

TO CHANGE RAMS or service the ram compartment you simply unbolt and swing the end doors open. And there's the ram on one side for easy access—the open ram compartment on the other side for checking or service.

Best of all, you don't break hydraulic lines or lose hydraulic fluid each time you open the XHP. Hydraulic lines are built into the body—*and the hinge pins*—for leak-tight operation whether the door is open or closed.

AND, OF COURSE, the Type XHP has such other Shaffer advantages as QUICK-DRAINING RAM COMPARTMENTS, with the rams traveling on guide ribs high above any mud or sand that may collect in the compartment bottoms . . . and COMPLETELY ENCLOSED DESIGN with no exposed operating parts to become jammed or damaged by timbers or objects falling into the cellar.

COMPARE feature by feature and you'll find that nothing on the market equals the Type XHP for high pressure work combined with operating dependability and simple maintenance.

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FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 546
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 827
HOUMA, LOUISIANA, Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

THIS FREE 12-PAGE BROCHURE gives you complete facts and figures on the Shaffer Type XHP. Write or phone your nearby Shaffer representative for your free copy!

Hole-size change

. . . measured with a caliper attachment now available for the Geo-Logger logging tool. The attachment can be opened or closed at will for quick information on hole-size variation at any point of penetration, the maker says. The tool and attachment can now be used to determine packer-seat location, for location of cavaties, to find different pipe sizes in old wells where the information has been lacking, and for formation correlation.

The caliper attachment is interchangeable with subsurface tools, meter unit, and control-unit components used in field loggers for other types of logging. Two arm sizes are available—2 to 18 in. and 2 to 36 in. Logging speed is 50 ft. a minute, the maker says. Source: **Well Reconnaissance, Inc., Box 1483, Dallas.**

●

Gasoline hose

. . . kept off ground when not in use with this latest hose retractor reel. Hose damage is thus prevented. The Model 200-8-GP reel is equipped with 8 ft. of strong Nylon-covered galvanized-steel cable. The spring motor in the reel has a lifting capacity of up to 8 lb. Easily installed, the reel requires no grommet for installation. The hood and cord guide on the reel act as a grommet. Delivery time: 10 days. Price: about $16. Source: **Benjamin Reel Products, Inc., 10700 Broadway, Cleveland 25.**

O-ring seals

. . . for high temperature now available are suited for sealing at temperatures up to 500° F. Primarily based on Viton, the SR 270-70 seals were developed to withstand the effects of both high temperature and the deteriorating properties of petroleum products. They are expected to prove particularly valuable for refinery and pipeline-sealing service.

In the presence of most petroleum-based materials, the seals do not swell. They are made in special shapes and sizes as well as in over 200 conventional O-ring sizes. Prices range from about $58 per 100 pieces for a 3/32-in. o.d. to $1,950 per 100 pieces for a 16-in. o.d. Source: **Stillman Rubber Co., 5811 Marilyn Avenue, Culver City, Calif.**

●

New additive

. . . to improve gasoline has been disclosed. Called Centrol S-41-K, the additive is reported to provide excellent carburetor detergency and anti-icing. It also serves as a mild rust inhibitor. Yet tests show it does not contribute to intake valve deposits, surface ignition, spark-plug fouling.

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Sealed Bid Opening February 9, 1960

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CONTROL ROOM—BUTADIENE UNIT

A Blue-Chip Special Purpose Facility

The Louisville Butadiene Plant, located in the "Rubbertown" area of Louisville, Kentucky is an exceptional offering for the astute investor. This special purpose plant was designed to produce butadiene from ethyl alcohol yet it is easily convertible to many other processes.

Located on a prime industrial site along the Ohio River, the facility is in marvelous condition. High volume tankage and processing equipment, low-cost transportation, complete utilities, considerable room for expansion, and a fine labor force are indications that this plant has all the requisites for high yield on the investment dollar.

All previous restrictions as to use or National Security clause have been lifted. If your company's processes are in any way similar to that of this facility, you may find that the purchase and conversion costs are minor compared to the productive capacity and advantageous location of the plant.

Is your organization ready for expansion or are you looking for a sound practical investment? In either case, the Louisville Butadiene Plant is well worth your immediate investigation.

This coupon will bring you bid form G-Kentucky-465, brochure and all information on the plant, land and equipment.

SPECIFICATIONS

Plant Consists of:
- Approx. 139 acres
- 24 permanent buildings of brick, steel and concrete construction plus many large auxiliary structures.
- Railroad Sidings, Parking Areas.
- Room for expansion.

Tankage:
- 10 storage tanks, 12,000,000 gallon capacity at atmospheric pressure.
- Three Hortonspheres, 750,000 gal. capacity at pressures up to 75 p.s.i.
- Large barge loading facilities.

Process Equipment:
- Plant consists of three processing units. Complete equipment list submitted with coupon request.

Utilities:
- Electricity, Natural Gas, Water, Water Treating, Steam, Waste Disposal, Fire Protection, Pumping Station available on site.

Rail & Barge Service:
- Plant served by spur of Kentucky and Indiana Terminal Railroad and by 5 barge lines.

ALL AS IS, WHERE IS

Bid Deposit 5% of bid price (max. deposit $50,000). Easy credit terms. Title conveyance by quitclaim deed and bill of sale without warranty.

SEALED BIDS will be opened on February 9, 1960 at 3 P.M. (CST)

GENERAL SERVICES ADMINISTRATION, Business Service Center
U.S. Courthouse, Room 575, Chicago 4, Illinois *OG*

Send immediately, complete details, specifications and bid form G-Kentucky-465 on the Louisville Butadiene Plant and site offered for sale.

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ADDRESS _____

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American® *Temperature Recorders* for an accurate record of flowing temperatures.

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AMERICAN® METER COMPANY
INCORPORATED (ESTABLISHED 1836)
General Offices: Philadelphia 16, Pa.
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sludge or varnish formation, or cause other bad side effects, the maker says.

At a suggested concentration of 50 p.p.m., the maker says the product prevents and gradually removes deposits on the carburetor throat and throttle plate. Source: **Central Soya Co., Inc., Fort Wayne, Ind.**

Walkie-talkie aids

. . . well servicing by overcoming the noise that can often make voice communications nearly impossible. The two-way radio is installed in safety hats. It is not much larger than a pack of cigarettes and is nested in the top of the specially designed hat.

A sound-canceling microphone makes it possible to transmit voice effectively when the surrounding noise level is unusually high. Two small batteries about the size of pin-light cells power the radio. The complete assembly weighs a little more than 2 lb. Source: **Dowell Div. of The Dow Chemical Co., Box 536, Tulsa.**

•

New idea in selling

. . . gasoline just disclosed is an electronically controlled, push-button delivery system for service-station operation. Called the Bowser Modular Electronic fueling system, it uses electronics in areas where mechanical devices are presently used. The maker says this design permits wide latitude in designing new service stations, in remodeling existing ones, and promises to provide more efficiency in service-station operation.

Aside from a conventional remote pump at or in the underground storage tank, the new system has three basic elements. These are an in-line

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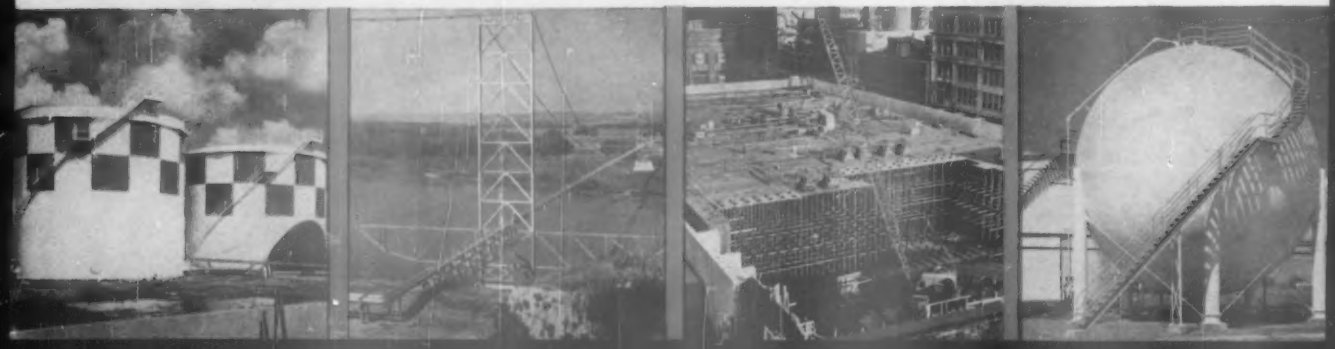
PDM and HIW provide service never before available . . . 12 fabricating plants advantageously located with built-in economies assure prompt attention at lowest costs. 120 years of combined experience include incomparable engineering skills, broad research, advanced techniques, and ample manpower schooled in the finest tradition of expert craftsmanship in metal fabrication. These are the features that enable the new PDM-HIW combination to offer a scope of services unmatched and never before available to Industry.



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12 plants to serve you coast to coast

Hammond Iron Works Join Forces

THE STORY OF HAMMOND IRON WORKS began in 1900 and for 60 years, storage tanks, processing vessels and kindred products of steel plate construction bearing the Hammond trade mark have been fabricated and erected in all parts of the free world . . . the Hammond patented conservation storage systems which have made significant contributions include the Tubeseal System for floating roof tanks, the Dialift and Diaflote diaphragm vapor saving tanks, the Hamondflote Cover which is the lowest-cost floating roof and the Vaporlift mechanical vapor saving tank.

PITTSBURGH-DES MOINES STEEL COMPANY began in Des Moines, Iowa in 1893, as an engineering and contracting firm in the waterworks field. Expansion to Pittsburgh in 1910 was reflected in the present company name. By 1958 two plants had grown to seven from Maryland to California, and PDM activities expanded to include every type of plate and structural fabrication from elevated tanks to wind tunnels . . . storage tanks to atomic energy structures . . . steel grandstands, bridges, buildings . . . special projects unlimited in size or complexity.

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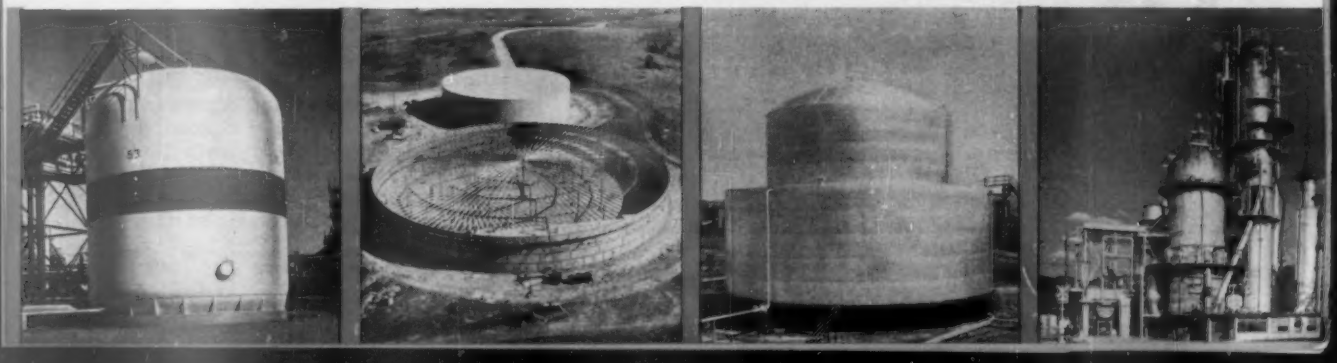
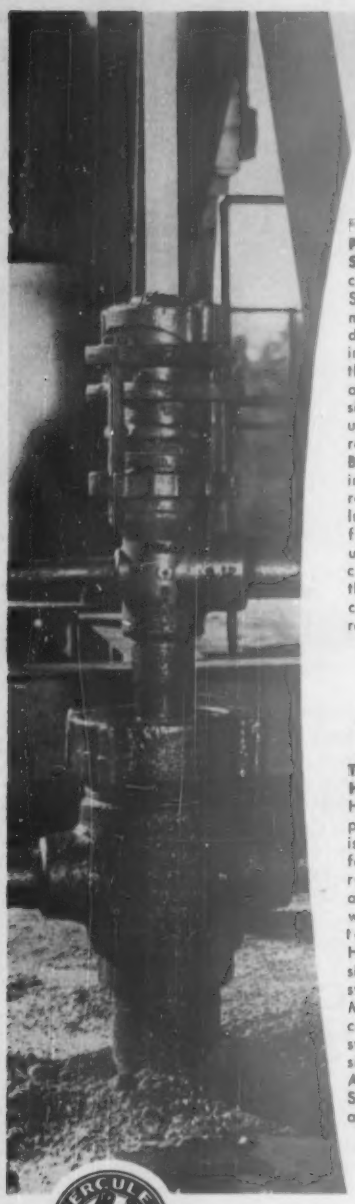
licensees and sales offices in many foreign countries including Argentina, Australia, Belgium, Brazil, Canada, Chile, Colombia, England, France, Haiti, India, Italy, Japan, Mexico, Netherlands, Peru, Puerto Rico, Sweden and W. Germany.

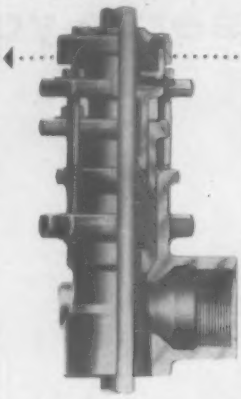


HERCULES products in ACTION

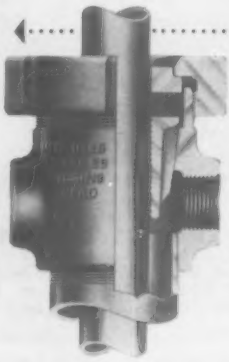


A typical set-up is shown below in Creek County, Oklahoma, using Hercules "Tee Type" Duplex Polished Rod Stuffing Box and Type "ES" Tubing Head. This is an easily assembled, effective and economical producing unit.

"TEE TYPE" DUPLEX POLISHED ROD STUFFING BOX—A combination Tee and Stuffing Box with female thread to screw directly onto the tubing, eliminating one threaded connection and resulting in a considerably shorter hook-up. With internal parts removed, the Stuffing Box body is full opening and need not be removed to pull rods. In addition to being furnished in the most used sizes, special combinations of threads and outlets can be furnished on request.



TYPE "ES" TUBING HEAD—This Tubing Head is ideal for any pumping situation. It is economical enough for shallow wells and rugged enough for any depth well, with working pressure up to 1500 pounds. Hercules self-aligning slips suspend the inner string in this Head. Mandrel suspension can be furnished instead of slips, if desired, at no extra cost. A neoprene Tubing Stripper Unit is also available.



Write for complete information on any Hercules Product.

HERCULES TOOL COMPANY

MANUFACTURERS OF OILFIELD EQUIPMENT

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Export Representative Oil Field Equipment Co., Inc. 90 West Street, New York, N. Y.

electronic flow meter that generates an electric current in direct relation to movement of gasoline, an electronic control unit, and an electronic computer-indicator.

The electrical current generated by the flow meter is carried by a circuit to the computer-indicator which registers simultaneously the gallons delivered and the total cost of the sale. Customer information is displayed on the face of the computer-indicator. The price or price range depends on specifications. But it is expected to be comparable with mechanical fuel-handling systems. Source: **Bowser, Inc., 1300 East Creighton Avenue, Fort Wayne, Ind.**

•

Samples transferred

. . . automatically from or to a measurement cell of a spectrophotometer, polarimeter, refractometer, or other analytical instrument with this Cary Autosampler. It also collects automatically samples from a source such as a sample line, chromatograph column, or fractionating column.

Operated with an analytical instrument, it makes a fully automatic system for sample handling and analysis. Up to 144 samples may be collected. The sampler has three removable racks. Each rack holds 48 test tubes used as sample containers. Delivery time: about 6 months. Price: from about $1,850 to $2,000. Source: **Applied Physics Corp., 2724 South Peck Road, Monrovia, Calif.**

•

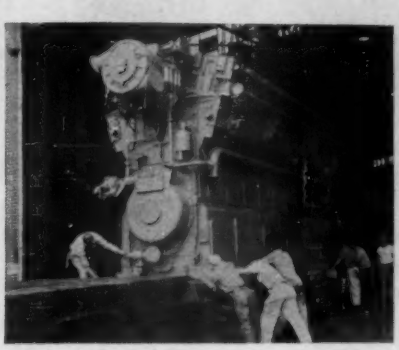
Motor for 600° F.

. . . has been developed. The new electric motor is capable of operating at 600° F. continuous ambient temperature, the maker says. Originally developed for high-speed aircraft, the motor promises to prove useful for high-temperature valve controls, blowers, and fans. It operates on three-

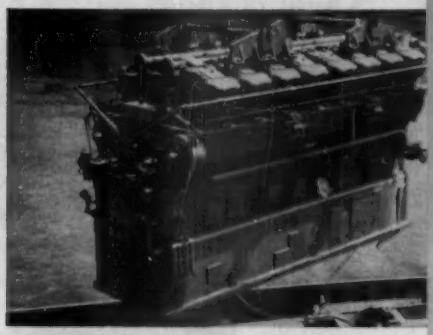
Landing Craft Cuts Construction Costs

Kellogg's Procurement Division Avoids Dismantling, Crating, Reassembling in Shipping Huge Diesel Engines to Mobil Oil Company de Venezuela Refinery

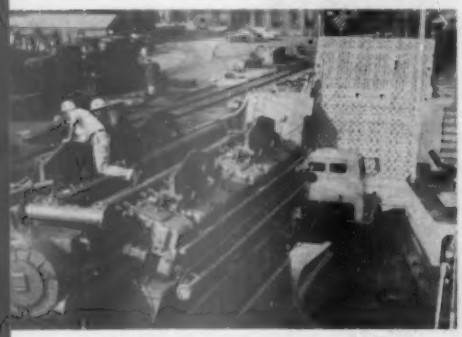
ASSIGNMENT: A 50,000 BPD refinery, complete with diesel electric power plant, being built by Kellogg for Mobil Oil Company de Venezuela at El Palito—100 miles west of Caracas, on the Caribbean.



PROBLEM: Minimize man-hours for delivering and installing four of these 100-ton diesel engines, required for the power plant, by avoiding the dismantling, crating, and reassembling usually needed.



SOLUTION: Have engines sent, fully assembled, by rail to Newport News, Va.—most economic shipping point from vendor's plant, and there hoist them to deck of a commercial landing craft.

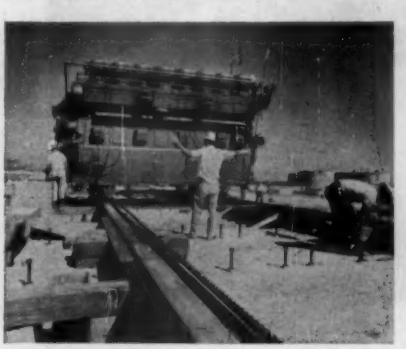


LOADING: Also on deck—loaded last so it could go ashore first—is a heavy-duty truck and lowboy, onto which one of the diesel engines has been lowered in readiness for landing near the refinery.

LANDING: Ready to move as the craft reaches El Palito, the first engine goes right up on shore—its landing facilitated by an earthern dock, quickly constructed by the refinery's bulldozer.

HAULING: With less than 1000 yards to go from landing place to refinery site, truck and lowboy make the first of four trips to complete the 400-ton shipment of diesel engines for the power plant.

APPROACHING: With assistance from the bulldozer, one of the huge diesels slowly approaches its destination—where foundations have been made ready to allow immediate installation of all four.



POSITIONING: Skids, hawsers, and hoists help to place one of the four engines in position on its concrete foundation, as skilled hands get ready to securely bolt the first unit of the power plant.

INSTALLED: Another example of Kellogg's ability to procure, deliver, and install refinery equipment at minimum cost, diesels are installed in Venezuela just ten days after leaving Virginia.

For the complete story of "Operation Landing Craft", write for illustrated booklet.

THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, NEW YORK

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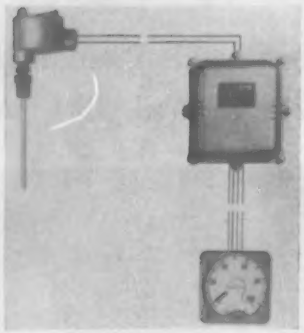
phase, 115-200 volt, 400-cycle power. Source: **AiResearch Mfg. Div. of Garrett Corp., 9851 Sepulveda Boulevard, Los Angeles.**

●

Level changes

. . . are visually shown with a capacitance type of system now on the market that can be used to measure and determine level changes of most liquids, slurries, powders, and granular solids. The Level-Tel 154 unit has no moving parts to clog, wear, or jam. Instead, it uses self-cleaning Teflon probe assemblies which, the maker claims, remain free of deposit buildup and are unaffected by adhesives.



The system consists of a probe, detector, transmitter, and indicator. It has a miniature capacitance bridge circuit housed in the probe electrical fitting that enables you to remotely locate the transmitter. Delivery time: 30 days. Price: about $290. Source: **Robertshaw-Fulton Controls Co., Santa Ana Freeway at Euclid Avenue, Anaheim, Calif.**

●

Dumper makes drum emptying easier

. . . thus saving time and labor over older methods. The Cesco Jr. Model DU dumper will lift and dump a variety of drum sizes. It can also be adapted to lift and dump bags. It is expected to prove useful for batch loading of mixers, blenders, tanks, and bins.

It comes with capacities to 400 lb. and dumping heights to 12 ft. The units can be stationary or portable. The dumper sells for about $1,100 to $1,500. Delivery time is about 4 to 6 weeks. Source: **Conveyors & Dumpers, Inc., Box 567, West Caldwell, N. J.**

●

Map cabinet

. . . saves space in offices while keeping dust from maps and drawings. The horizontal sectional type of file gives a large capacity per square foot of floor space. The cabinet section, when

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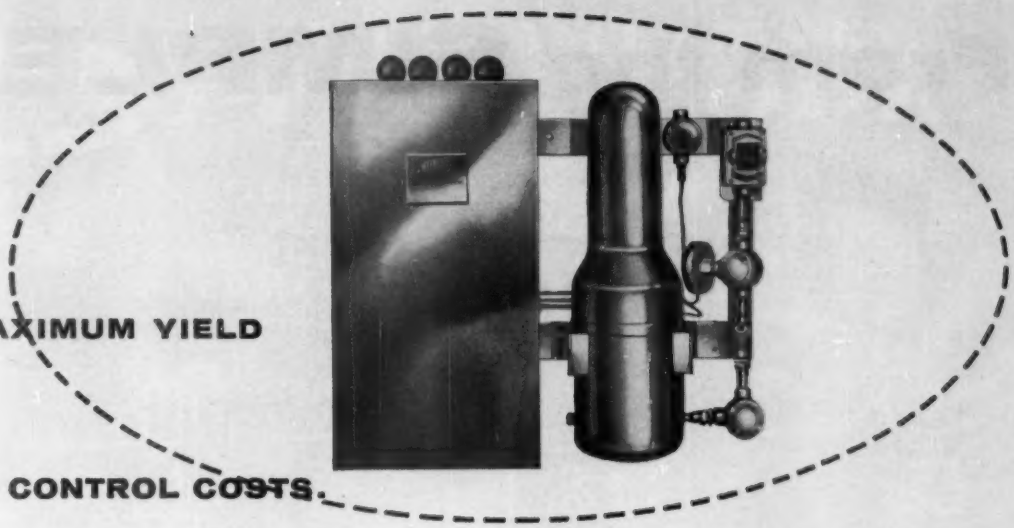

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LOWER CONTROL COSTS.

THE NEW TOTCO *continuous* END-POINT ANALYZER

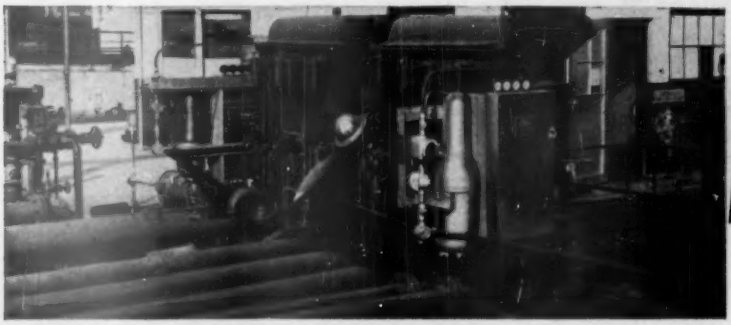
TOTCO's *continuous* End-Point Analyzer pays its own way in profits . . . by giving refinery operators a new and unique control over product quality and yield. This sensitive instrument is always on the job —right at the operating unit — for the *continuous* analysis of any petroleum product where the end boiling point is critical.

It automatically indicates the Engler End Point of a hydrocarbon stock or commodity in an operating range of 200°F. to 600°F.

The unit responds immediately to any variation in the end boiling point of the sample, and its *continuous* signal may be fed directly to a controller as well as to a recording chart. It delivers reproducibility within ±1°F., with results that correlate with ASTM D-158 or ASTM D-86.

Depend on this TOTCO Analyzer to reduce control costs by saving time. Its *continuous* analysis cuts the usual delays between quality change and compensating plant control...eliminates the time lag of batch analyzers or conventional laboratory tests.

Write or call today for further information.



TOTCO continuous End-Point Analyzer in operation at Union Oil Company Refinery, Wilmington, California.

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Illustrated technical literature available free on request.

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TECHNICAL OIL TOOL CORPORATION

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BUILDING BLOCK DESIGN

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NO PRIMARY POWER NECESSARY AT TANK

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FIELD TESTED COMPONENTS AND SYSTEMS

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10 TO 1000 POINT SELECTION

LOCAL TYPE SYSTEM:
(DIRECT WIRED SYSTEM)

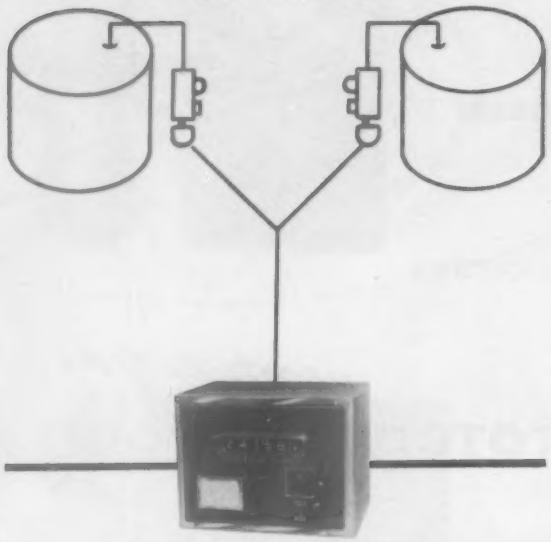


FIG. 9310 SERIES RECEIVER

"Varec"

PRINTED CIRCUITS

•

INHERENT PARITY CHECK

•

CODED PULSES

•

TRUE REMOTE OPERATION CHECKING

•

SPOT OR AVERAGING TEMPERATURE COMPATIBLE WITH ONE FIELD UNIT (NO DUPLICATION OF EQUIPMENT)

•

JET SPEED — ANSWERS • 5 SECONDS

to the COMPLEX...

One or hundreds of tanks. One measurement or many. Control function and alarm signals. A few feet or hundreds of miles. Direct wire, low grade communication pair, tone or microwave. Manual selection or programmed scanning with automatic lockout. Digital readout. Transceiver output suitable for entry into almost any conceivable type of digital data processing equipment.

That's "Varec's" Pulse Code Telemetering * System designed specifically for the petroleum and petro-chemical industries to remotely indicate measurements and alarm conditions and to perform supervisory control functions.

Simplicity of application is matched by simplicity of instrumentation. Complexity of application is matched not by complex instrumentation, but by combining production line "building block" units in an arrangement commeasurable with requirements.

A complete "Varec" Pulse Code Automation System can handle with a single or multiple receiver installation the following:

Liquid Level, Flow (P.D.M.) Volume, Temperature, Pressure, Valve Control, Pump Control, Supervisory Data Gathering and Reduction.

For complete information on "Varec" Pulse Code Systems, we invite you to contact your nearest "Varec" representative, or send for New Bulletin CP — 3707.

* Patents Pending
U.S.A., Great Britain, Japan
Patented
France, Pat. No. 1,163,861

"Varec"
TRADE ® MARK

THE VAPOR RECOVERY SYSTEMS COMPANY

P-7

"VAREC", 2820 NORTH ALAMEDA STREET, COMPTON, CALIFORNIA. *Branches and Representatives in Principal Cities.*

PROVEN–ADVANCED DESIGN...

"Varec" PULSE CODE

COMPLETE AUTOMATION SYSTEM

LIQUID LEVEL • P.D. METERS • TEMPERATURE • PRESSURE
VALVE CONTROL • PUMP CONTROL • SUPERVISORY
DATA GATHERING AND REDUCTION SYSTEM

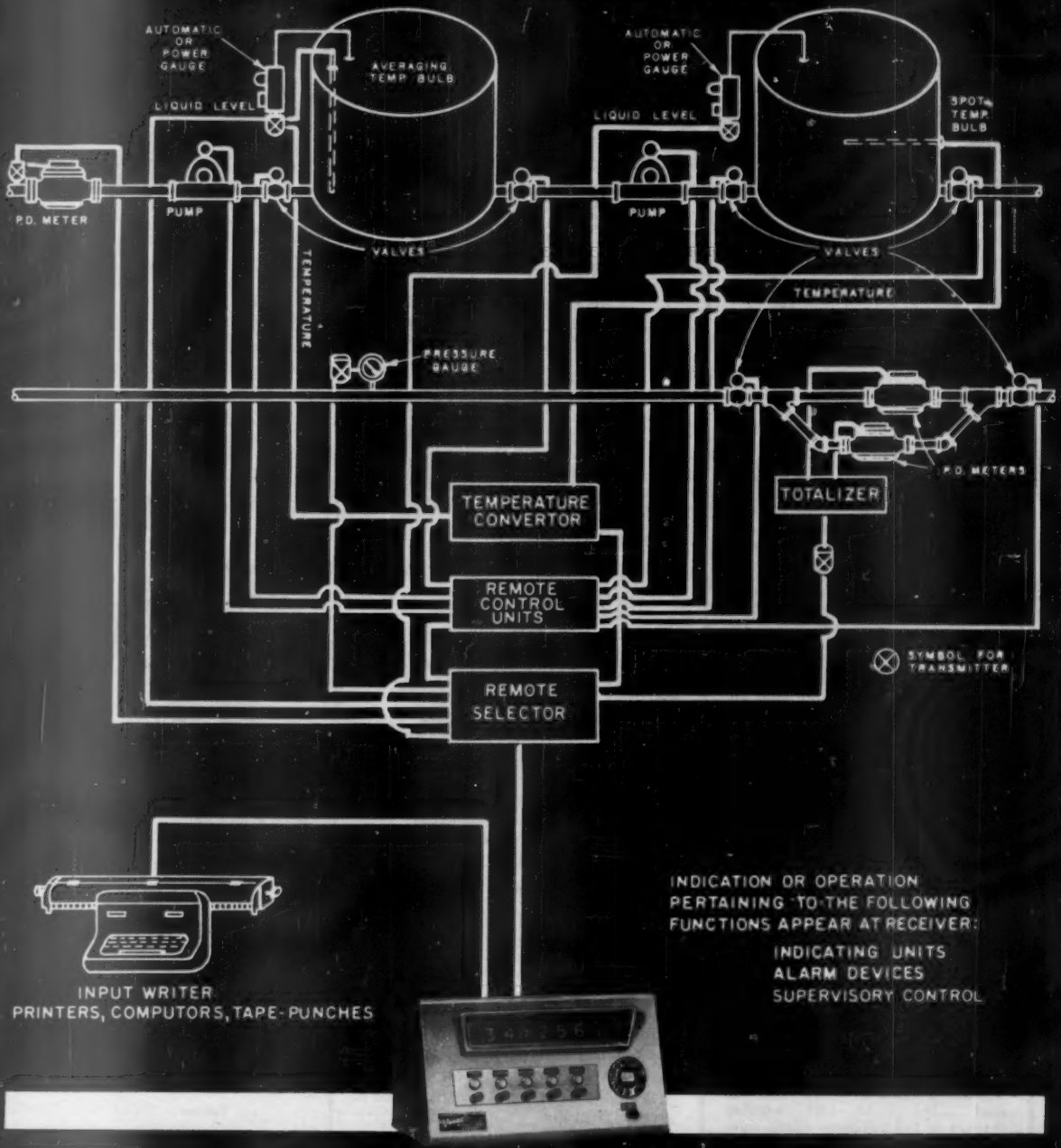


FIG. 9346 SERIES RECEIVER

J. K. LASSER Tax Institute Shows Extraordinary Returns from OIL & GAS

USE THIS MANUAL FOR 2 WEEKS WITHOUT COST!

NEW YORK, N. Y. —A costly research project into the fabulous field of oil and gas investments has just been completed by the J. K. Lasser Tax Institute. Their findings are of urgent importance now to individuals who seek extraordinary capital growth and high income from relatively small investments — *in addition to tax advantages of a truly unique nature.*

Until now there has been no single source of accurate and unbiased information on this enormously rich area of investment. That is why investors should not fail to see a free examination copy of this extraordinary new guide.

How To Get Tax-Protected Income From Oil and Gas Investments

Revised & Enlarged 2nd Edition

Now you need not be an "insider" to participate in the tremendous income, capital building and tax benefits inherent in oil and gas. This manual shows you:

(1) **How to get into oil and gas investments; how investment opportunities develop and how to share in them; acquiring interests; joint operations; development, operation, and payment to investors, etc.**

(2) **How taxes reduce the risk; tax plans which produce maximum net-after-tax returns; family tax plans; organizing oil and gas ventures; assuring your retirement through oil.**

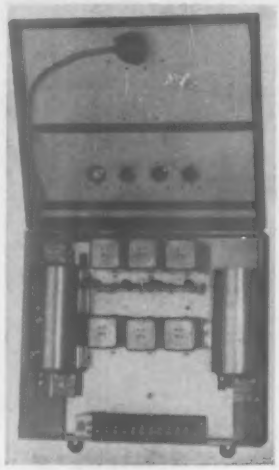
(3) **Actual case-histories of oil and gas investments and the potential payoffs (with these to guide you, you can readily decide the best money-making strategy).**

Why miss out on the benefits of this tremendous field? Send today for a free examination copy. Keep it for two weeks, then return it without obligation, or keep it and send only $12.50 plus shipping charges in full payment. (Save shipping charges by remitting $12.50 now—same refund privilege.) Write today to Dept. OG-10, Business Reports, Inc., Larchmont, New York.

placed upon the base, will file 800 to 1,000 maps in 16 sq. ft. of floor space.

Each map is filed in a 2 by 2 in. square compartment. No tubes are used. The drawer-like slide prevents injury to maps as they are removed from the cabinet. Called the Seven Star Space Saver, the cabinet provides an index system clearly and instantly at the finger-tips. Prices range from $187.50 for a map capacity of 100 to $297.50 for a capacity of 200 maps. Source: **Port City Cabinet Works, 1810 Kerne, Houston 9.**

●



Control protects

. . . engines and gives accurate, on the second, cranking cycles. A steel dustproof cabinet with knockouts houses the Series 1456 electropneumatic control unit.

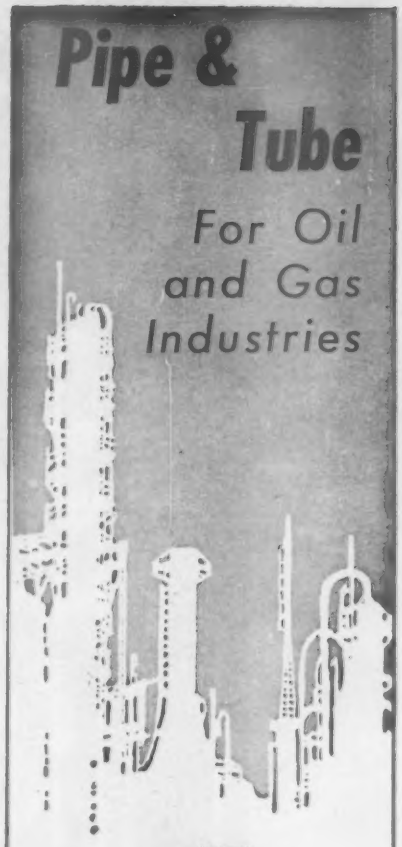
Each of the cycles—cranking, rest, and total cranking — are individually adjustable from 0 to 120 seconds. A switch on the front panel gives the choice of automatic, off, or manual operation. Warning lights are mounted on the panel for over-crank, oil, water, and overspeed. Source: **Syncro-Start Products, Inc., 8151 North Ridgeway Avenue, Skokie, Ill.**

●

Plastic barrier rope

. . . guards lives and provides a means of roping off restricted areas and work projects both inside and outside the plant. The yellow and black color-combination polyethylene rope comes in a 5/16-in. diameter and yields 46 to 50 ft. to the pound. Test strength is about 1,500 lb.

Price is approximately $2.25 per pound. Source: **Albert W. Pendergast Safety Equipment Co., Tulip and Longshore Streets, Philadelphia 35.**



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Now You Can Get up to 140°

Guaranteed Dewpoint Depression!

THE NEW BS&B **DEW DROP*** WITH TRIETHYLENE GLYCOL PRODUCES EXTREMELY DRY GAS . . . PERMITS DEHYDRATION AT MUCH HIGHER WELLHEAD TEMPERATURES!

*DEW DROP is a trade name of Black, Sivalls & Bryson, Inc.

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Ask Your BS&B Man, or Write to . . .

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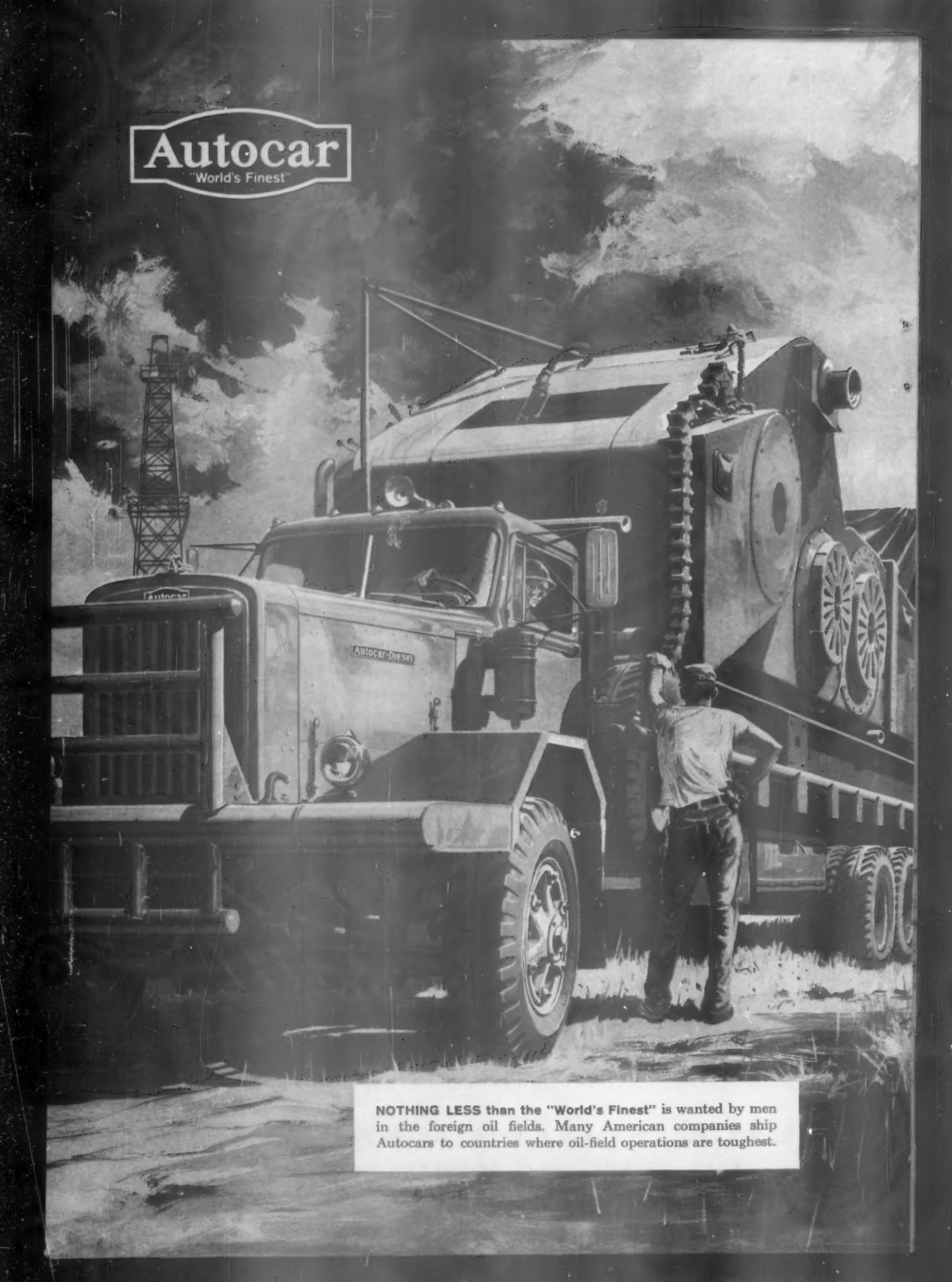
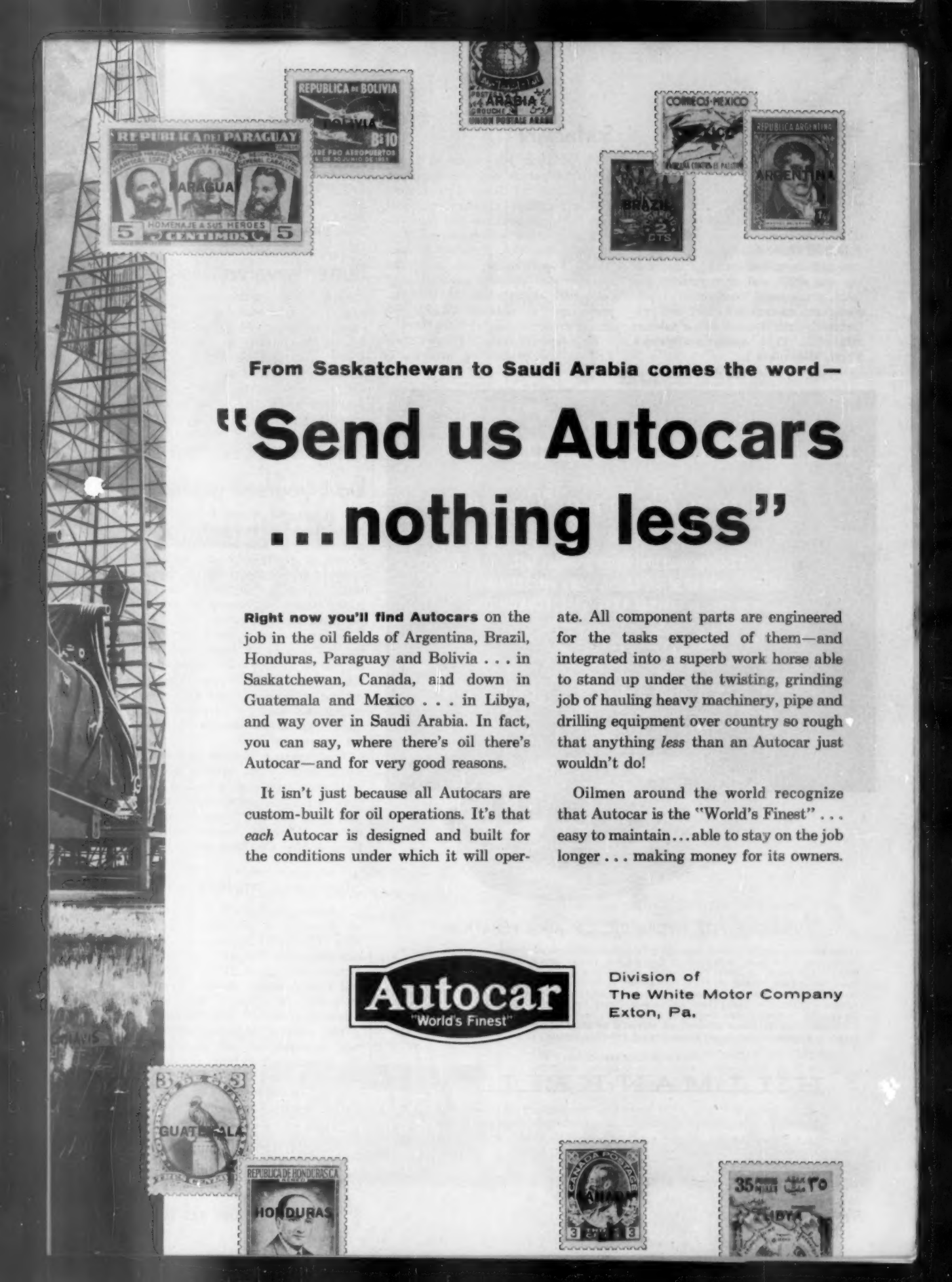
DEPT. 1-A12 P.O. BOX 1714, OKLAHOMA CITY



NOTHING LESS than the "World's Finest" is wanted by men in the foreign oil fields. Many American companies ship Autocars to countries where oil-field operations are toughest.



From Saskatchewan to Saudi Arabia comes the word—

"Send us Autocars ...nothing less"

Right now you'll find Autocars on the job in the oil fields of Argentina, Brazil, Honduras, Paraguay and Bolivia . . . in Saskatchewan, Canada, and down in Guatemala and Mexico . . . in Libya, and way over in Saudi Arabia. In fact, you can say, where there's oil there's Autocar—and for very good reasons.

It isn't just because all Autocars are custom-built for oil operations. It's that *each* Autocar is designed and built for the conditions under which it will operate. All component parts are engineered for the tasks expected of them—and integrated into a superb work horse able to stand up under the twisting, grinding job of hauling heavy machinery, pipe and drilling equipment over country so rough that anything *less* than an Autocar just wouldn't do!

Oilmen around the world recognize that Autocar is the "World's Finest" . . . easy to maintain . . . able to stay on the job longer . . . making money for its owners.

Autocar
"World's Finest"

Division of
The White Motor Company
Exton, Pa.

SHOWCASE . . .

New Literature

Scroll-casing

. . . centrifugal compressors are described in new 12-page Bulletin 16B6048C now obtainable. The literature includes a description of the bearing and shaft seal arrangements for three single-stage compressor types, along with an impeller chart and performance data. Source: **Allis-Chalmers Mfg. Co., 1126 South Seventeenth Street, Milwaukee 1.**

Surfactant

. . . information is plentiful in a new 48-page brochure, describing properties and uses of Tergitol surfactants. The publication contains extensive data for eight nonionic and four anionic Tergitol surfactants, including selection, solubilities, properties, formulations, applications, performances, specifications and test methods, shipping, bulk storage, and physiological properties. A detailed bibliography and reference section is included.

Both types of surfactants give rapid wetting and penetrating action, but under different conditions. The Tergitol nonionic surface-active agents are of the polyethylene glycol-ether type, while the Tergitol anionic surface-active agents are basically sodium salts. Source: **Union Carbide Chemicals Co., 30 East Forty-second Street, New York 17.**

HILLMAN-KELLEY

Power Casing Tongs

a field-proven tool which provides fast, uniform make-up of the casing string without use of spinning rope or cathead. FAST, SAFE, ECONOMICAL

AVAILABLE FOR HYDRAULIC OR AIR OPERATION

CALIFORNIA: D. F. "Duke" Bloom Company, Bakersfield, Long Beach and Ventura • **KANSAS:** B. & B. Casing Crew, Great Bend; Jake's Tubing & Casing Crews, Liberal; John C. Murray Casing Crews, Great Bend • **LOUISIANA:** St. Landry Drilling Company, Incorporated, Eunice • **NEW MEXICO:** Johney M. Myers Casing Crew, Farmington; Power Tong Service, Incorporated, Hobbs • **OKLAHOMA:** Independent Casing Crews, Oklahoma City; Nichols Casing Crew, Oklahoma City & Shattuck; Tuttle's Casing Crew, Norman • **TEXAS:** Bob's Casing Crews, Incorporated, Odessa; Cobb's Casing Crews, Odessa; James Mosier Casing Crew, Perryton; Process Engineering Company of Ft. Worth, Texas, Incorporated, Ft. Worth; Red's Casing Crews, Odessa; Reneau's Casing Crew, Snyder • **WYOMING:** Casper Rental Tool Service Company, Casper • **CANADA:** Rig Service and Rentals Limited, Edmonton, Alberta

(SOLD ONLY FOR EXPORT USE)

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Main Office & Plant: 1000 Macy St., Los Angeles 33, California
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OTHER H-K POWER EQUIPMENT:

TUBING TONGS • SUCKER ROD WRENCH • POWER UNITS

Butterfly-valve designs

. . . for 9,000 applications are contained in new Bulletin 50-1. Eight valves are presented in tabular form for simple comparison and selection. Valve sizes range from 1 to 108-in., with pressure drops up to 1,200 psi. and temperatures to 2,000° F. The four-page publication includes photos, allowable pressure drops, materials, and installation data. Source: **Continental Equipment Co., Coraopolis, Pa.**

Do-it-yourself guide

. . . is featured in new Bulletin 759T entitled Ratchet-Pipe Turnbuckles, just issued. The turnbuckle is designed to position, brace, and lash down heavy loads in various applications, including tying down loads on trailer trucks, positioning pipeline augers, and adjusting valves.

Equipped with a standard handle, the ratchet-pipe turnbuckle will push or pull up to 10,000 lb., according to the bulletin. The do-it-yourself section outlines steps to be taken when determining the exact style, type, size, and end fittings of a turnbuckle best suited for a particular job.

The four-page bulletin lists handle styles, barrel sizes, eyebolts for use with chain, wire rope, pins, and clevis jaws. Breaking-strength data for each size, part, and end fitting is included for easy reference. Source: **American Forge & Mfg. Co., McKees Rocks, Pa.**

Steelcase meters

. . . known as Types B, A, M, and C are discussed in new, obtainable Bulletin 313. Type B meters have capacities from 150 to 3,200 cfh. Type M meters handle from 210 to 1,700 cfh, and Type A meters measure from 600 to 3,400 cfh. Type C meters have capacities from 600 to 6,000 cfh.

The publication gives data on design, construction, and operation of the meters, and includes dimensions, connections, and shipping weights. Source: **American Meter Co., 920 Payne Avenue, Erie 6, Pa.**

Fracturing-fluids

. . . friction-loss calculations are contained in a newly published 40-page

Trans-Gulf uses REDA Submergible Electric PUMP for Offshore Drilling

Trans-Gulf Offshore Drilling Inc., uses Reda Submergible pumping equipment to provide water for such rig operations as mud mixing, rig washdown and fire protection.

The 20 H.P. Reda used in this application produces 570 g.p.m. against 100 feet head. Its corrosion-resistant construction assures long life and dependable service.

Reda Pump Company has over 35 years of experience in the manufacture of pumps handling corrosive liquids and offers a complete line of pumps:

- **⅓ to 250 H.P.**
- **For depths to 10,000 ft.**
- **Capacities to over 1000 g.p.m.**
- **High discharge pressures**
- **Ease of Installation**
- **Minimum Maintenance**

SIGN OF QUALITY SUBMERGIBLE REDA PUMPS

For additional information, contact your nearest Reda dealer, or write

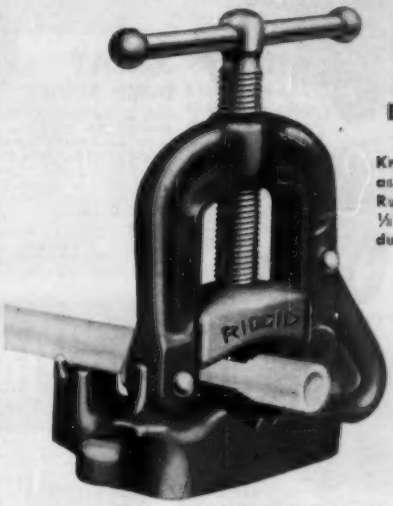
REDA PUMP COMPANY
BARTLESVILLE, OKLAHOMA
World's Largest Manufacturer of Submergible Pumps for Oil, Brine, Water, Gasoline, Jet Fuel, Chemicals and LPG.

New RIDGID Bench Chain Vises
with Large, Easy-to-Operate Top Screw Handle. 5 Sizes for ⅛" to 8" Pipe, Conduit, Rod.

Sure Grip

RIDGID Pipe Vises

Save you time on every job!



RIDGID Bench Yoke Vises
Known Everywhere as Extra-Handy and Rugged. 8 Sizes for ⅛" to 6" Pipe, Conduit, Rod.

Whether you prefer a chain or yoke bench vise, you're sure of a slip-proof, time-saving grip if it's a RIDGID with replaceable, heat-treated, tool steel jaws. Rear rest keeps pipe, conduit, bolts or rod always straight for easy cutting, threading or reaming. Handy pipe bender . . . extra-rugged yoke and base of special malleable iron.

You'll like the extra quality built into RIDGID Pipe Vises . . . into every RIDGID Work-Saver Pipe Tool . . . your guarantee of trouble-free service for fast pipe work. See and buy them at your Supply House!

RIDGID

The Ridge Tool Company • Elyria, Ohio, U. S. A.

brochure. Twenty-seven pages are devoted exclusively to graphs showing density vs. sand concentration, hydrostatic pressure vs. depth, effect of friction pressure on horsepower, and Fanning friction factor vs. Reynolds number.

Other graphs offer information on friction pressure vs. rate and deal with different-size tubing, drill pipe, and casing. Source: **Halliburton Oil Well Cementing Co., Duncan, Okla.**

Efficient use

. . . of heavy fuels with Enterprise engines is the topic of new Folder EG-B47, which presents an illustrated description of a typical Enterprise engine heavy-fuel system. The six-page literature defines heavy fuels and explains how it is possible to burn them in diesel engines, the result being more economical power. Source: **Enterprise Engine & Machinery Co., Eighteenth and Florida Streets, San Francisco.**

Chlorinating-agents

. . . Brochure 328-B summarizes methods and types of reactions in which chemicals are most advantageously used for chlorination. A list of literature references completes the discussion of each chlorinating agent. Chlorinating agents described are elemental chlorine, hydrogen chloride, sulfuryl chloride, thionyl chloride, and the chlorides of phosphorus, sulfur, and antimony. To assist you in evaluating each for your own requirements, some of the more important aspects of their use in the production of organic compounds are included, as well as the type of chlorination to which each is best adapted.

The 24-page brochure also contains a complete table of physical properties of the chemicals mentioned and literature references to physical-property data. Source: **Hooker Chemical Corp., P. O. Box 344, Niagara Falls, N. Y.**

Koznig
BODIES
SERVICE BODIES
. . . for ½-, ¾-, and one-ton truck chassis. All-steel electrically welded into one unit . . . watertight compartments with double panel doors. Recessed paddle handles with cylinder locks keyed alike.
3-WAY
DUMP BODIES
Dump to the right, left and rear . . . the perfect dump body for windrowing, backfilling and precision dumping where space is limited. Adaptable to all standard truck chassis.
SIDE BOXES
For all pick-up trucks. Watertight compartments . . . double panel doors . . . recessed paddle handles with cylinder locks keyed alike. Eleven types, seven lengths available.
KING WINCHES
THERE'S A KING WINCH TO FIT YOUR NEEDS
Custom-made for practically all makes of trucks . . . complete, ready-to-install, ready-to-operate units with pulling capacities up to 19,000 lbs.
Write for free literature.
Koznig
INFORMATION IN REGARD TO YOUR SPECIFIC NEEDS ON REQUEST
IRON WORKS, Inc.
P. O. BOX 7726 • HOUSTON TEXAS

Electric-plant

. . . price list covers both gasoline and diesel electric plants. Available upon request, the eight-page revised price list (Form SE-18) has been laid out as a convenience as many accessories and extra equipment items have been added. Source: **Universal Motor Co., 420 Universal Drive, Oshkosh, Wis.**

Reinforced concrete

. . . construction known as the grid system is described in a new four-page folder now obtainable. The system, using steel grid domes in 2-ft. modules, speeds building time and saves material and labor costs over comparable-strength flat-slab construction, the literature reports.

The folder presents illustrated descriptions of the system, steel grid domes, formwork and utility layouts, as well as typical safe-load tables and layouts of ceiling and floors using grid-system construction. Source: **Grid Flat Slab Corp., 761 Dudley Street, Boston 25.**

Speed reducers

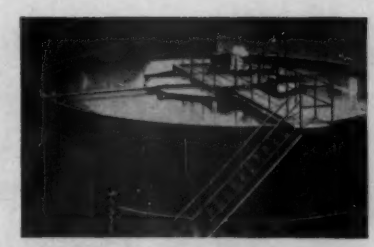
. . . for cooling towers are featured in Bulletin 135-S now available upon request. The eight-page literature describes Type CU drives, and includes dimensions, horsepower ratings, lubrication data, and photos. Source: **Cleveland Worm & Gear Co., 3300 East Eightieth Street, Cleveland 4.**

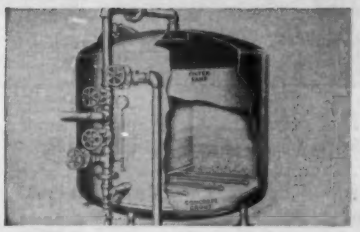
Solenoid-valve stock list

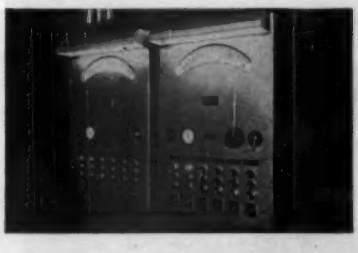
. . . contains engineering information, simple selection guide, and illustrations and flow diagrams of every type valve which the manufacturer produces. Sixteen-page Selection Guide 506 also provides prices and shipping information. Source: **Automatic Switch Co., Florham Park, N. J.**

You get dependable performance for all types of brine and water treatment with INFILCO equipment

INFILCO







ACCELATOR®
plants for clarification, softening and stabilization
Effective mixing of chemicals and raw water with recirculating slurry and downflow separation effect better treatment in minimum area — and at low cost. For water, brine or waste treatment.
BULLETIN 1825

CHEMICAL FEEDERS
Accurately controlled feed rates and maximum economy
Compact designs for automatic or manual control, for all types of chemicals. Type E Feeders dispense dry chemicals volumetrically, from bulk storage to dry or wet applications. BULLETIN 215

NEUSOL® FEEDERS
Wide feed range, corrosion resistant construction adapt this versatile and dependable displacement feeder to most chemical solution requirements.
BULLETIN 340

AERATORS and DEGASIFIERS
For all types of gas-liquid transfer applications. Efficient oxidation, carbon dioxide and hydrogen sulfide removal.
BULLETIN 106
Request information on recarbonators, deaerating heaters and vacuum degasifiers.

PRESSURE FILTERS
Standard or special construction for the most exacting process requirements
Vertical or horizontal, sand or anthracite types with manual or automatic controls for water or brine filtration. BULLETIN 1530
The **STELLAR®** diatomite filter, with its exclusive "gas-bump" cleaning is standard for amine solutions in most of the largest gas companies. BULLETIN 1560

MODERN INSTRUMENTATION
Maintains efficiency, reduces operating cost of treatment
Design and assembly of pneumatic, electric or hydraulic control components for manual or automatic, constant or variable rate plants. Operating consoles and control panels specifically engineered for complete treating plants. BULLETIN 1100

INFILCO
General Offices · Tucson, Arizona · P.O. Box 5033
Field offices throughout the United States and in foreign countries

57402

INFILCO CAN help you solve any water and brine treatment problem in oil production and refining

From experience, extending over 60 years, INFILCO can give you the best results with lowest *first* cost and *operating* costs.

No other line of equipment is so complete—none so advanced in method and design. Above are a few examples.

It will pay you to investigate. Inquiries are invited on all matters relating to water or brine treatment. Write today for new condensed catalog, Bulletin 80, for a more complete description of INFILCO products.

THE ONLY COMPANY impartially offering equipment for ALL types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.

▶ ▶ ▶ Equipment Men Notes

Stanley R. Hill joins sales staff ... of W. C. Norris, Mfr., division of Dover Products of Canada, Ltd. He has been assigned to the company's Canadian sales division at Edmonton, Alta., and will headquarter in Calgary. Hill has had 8 years experience in oilfield-equipment sales.

Kenneth L. Palmer is appointed . . . advertising manager of National Supply Co., succeeding Allen P. Colby who recently retired. Palmer joined National in 1952 after experience as a reporter and feature writer for an Ohio newspaper. He was promoted to assistant advertising manager 2 years ago with responsibility for the company's technical literature and direct mail. In his new assignment, he will also be responsible for all trade publication and newspaper advertising.

K. L. Palmer

First combined Cabot-Franks sales meeting held

. . . at Pampa, Tex., earlier this month. Clyde M. Lackey, sales manager, was chairman of the sessions. C. C. Simmons, director of sales and service, said that the Cabot Shops, Inc., meeting coordinated the efforts of pumping unit and servicing unit salesmen in all territories.

J. C. Williams, president of the Association of Oilwell Servicing Contractors, and Dr. Charles E. Irvin, sales promotion specialist of General Motors Corp.'s Detroit Diesel Division, were special guest speakers.

Shown above are, front row from left: Paul Sloanaker, K. M. Lamer, C. C. Simmons, R. A. Baker, vice president and manager; C. M. Lackey, John Leyh, A. J. Rogers, and Vern Alley. Second row: Hilmar Heinritz, Roy Grigsby, Don Turner, Jeff Gray, Ralph Dicus, Fred Tinsley, Dave Kelley, Albert Hastings, and Tom Stringer. Third row: Al Wagner, John Campbell, Tom Knobloch, Harold Smith, Joe Winter, and C. B. (Bud) Arndt.

Midwest Piping Co., Inc. names . . . three to new positions. Louis H. Niebling, former Chicago district manager, has been appointed general manager of southwest operations, including manufacturing, fabrication, construction, and sales. Niebling, who has been with Midwest for 31 years, formerly was manager of the company's engineering department. He will locate in Houston.

Walter J. Janesch, previously sales representative for the Chicago area, has been named Chicago district manager. He formerly served in the city sales department of Midwest's St. Louis office. N. G. Saldana, former project engineer in St. Louis, has been transferred to the Chicago office as sales manager for fabrication and construction.

William A. Wood, Jr. joins . . . the technical sales department of Carboline Co. in Houston where he will be associated with O. A. Melvin covering technical sales in the Texas-Louisiana area. Wood has been active in the field of protective-coatings design, sales, and service in the Gulf Coast area for over 10 years.

A. B. Chance Co. organizes . . . a new division in Houston to serve pipeline and production companies. Alex Mackie, former Chance sales manager for oil and gas-industry products, has been named manager of the new Petroleum Equipment Engineering & Services Division.

The division will handle sales of anchors and related products, while offering a field-engineering staff to make recommendation as to the number and types of anchors needed and to furnish necessary power-installing equipment and installation supervisory personnel.

Riedl is named product manager . . . in charge of the heat-exchanger products department of American Standard Industrial Division, reports E. W. Petersen, the division's vice president in charge of marketing. In his new position, Richard J. Riedl will be responsible for all phases of market planning, evaluation, and devel-

THREE-DAY SEMINAR conducted by Crane Packing Co. for southwest area customers was held recently at The Houston Engineering and Scientific Society headquarters in Houston. Attending were some 30 engineering, operating, and maintenance supervisors from petroleum refining and petrochemical plants in the area. Theme of the seminar was How to Get the Most from Your Seal and Packing Dollar. This was one of a series of seminars sponsored by Crane this year for customers in various industrial classifications.

"This GUIBERSON DRILLABLE PACKER runs, sets and drills faster than any other permanent packer"

HERE'S WHY!

Guiberson Type A Drillable Packer..

REDUCES PREMATURE SETTING Casing drag and junk impact are transmitted through the mandrel shoulder directly to tubing string.

REQUIRES ONLY ONE-HALF TUBING TRIP to set and place in production . . sets on wire line, too.

REQUIRES LESS SETTING FORCE Spring loaded lower slips are held drag-free from the casing until packer is set . . teeth remain sharp.

REQUIRES LESS DRILLING TO REMOVE Top slips are first part drilled. After drilling through them, packer can be fished out, or ½ to ⅔ of packer can be drilled and rest pushed to bottom of hole.

USES A SUPERIOR, OIL FIELD PROVED PACKING ELEMENT . . made in Guiberson plant.

FORMS A POSITIVE SEAL Unique internal mandrel shoulder expands packing element. All weight and high pressures are transmitted to packing element for a positive seal.

Compare Guiberson Drillable Packers for single or multiple-zone production . . acidizing . . pressuring operations . . water-flooding . . testing . . corrosion control . . many other completion jobs. Their speed and efficiency of setting and positive seal cut operating and replacement costs.

There's a Guiberson packer for every drillable packer application . . See your Guiberson man

TYPE A — With flapper valve and junk pusher

TYPE AN — No flapper valve.

TYPE AG — No flapper valve . . has guide body in place of junk pusher

TYPE AT — Has integral tail pipe connection . . no flapper valve

TYPE W — Small diameter . . wire line set only

TYPE AR — Small mandrel ID . . with flapper valve

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TYPE A2R — Doubly restricted mandrel ID

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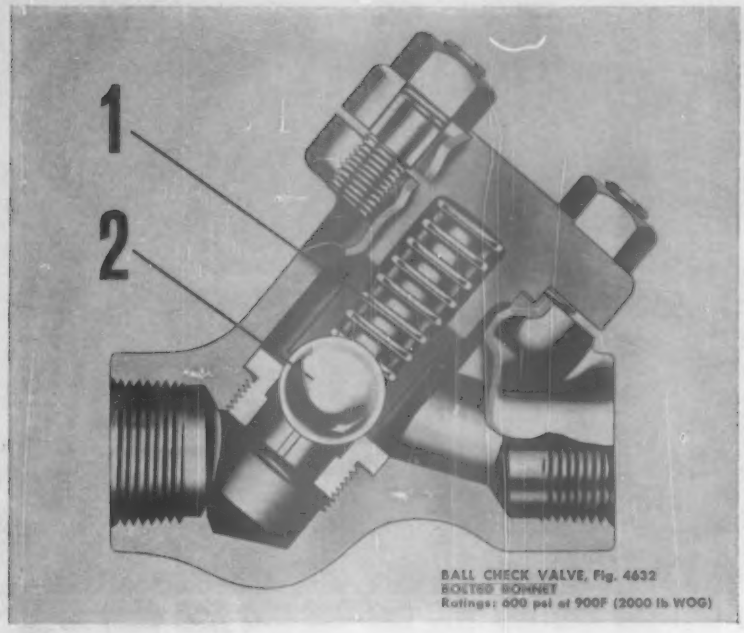

BALL CHECK VALVE, Fig. 4632
BOLTED BONNET
Ratings: 600 psi at 900F (2000 lb WOG)

You get longer valve life with...

Edward Check Valves for petroleum services

For the many petroleum services from oilfield to refinery where protection against flow reversal is required, Edward furnishes a complete line of forged steel check valves for horizontal or vertical installation.

EDWARD BALL CHECK VALVES are specially designed to provide rugged, shock-free service where liquid or heavy viscous fluids are piped. The stainless steel spring (1 above) is sized and rated to give positive seating with heaviest of fluids. And the ball disk (2), made of EValloy 16% chromium stainless steel for tight seating, can be easily replaced when needed.

EDWARD PISTON CHECK VALVES also give freedom from shock or vibration, plus streamlined body design for full flow area and low pressure drop. Exclusive disk guide and spring loading allow for quick, positive seating.

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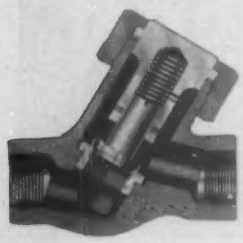
- rugged bodies of specially heat treated forged steel
- strong spring of stainless steel for sure closing action
- corrosion-proof stainless steel seats, and stainless steel piston disks or ball disks
- union, screwed, or bolted bonnet available

Edward builds a complete line of cast and forged steel valves for pressures to 10,000 lbs, with flanged, screwed, socket or butt welding ends. For additional information, see your favorite distributor, or write Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company.


PISTON CHECK VALVE, Fig. 3578
UNION BONNET
Ratings: 1500 psi at 850F (3600 lb WOG)

EDWARD STEEL VALVES
another fine product by
ROCKWELL

opment for heat-exchanger products.

In 1950, he joined Ross Heat Exchanger Division of American-Standard in Buffalo, which became a part of American-Standard Industrial Division in January of this year. Riedl was manager of contract engineering at the Buffalo plant before going to his new Detroit position.

Vernon B. Williamson promoted

V. B. Williamson

... to South Texas district manager, with headquarters in Alice, for United Supply & Mfg. Co. Williamson moves to his new position from Houston where he was city salesman. He had also served in South Louisiana during his 12 years service with United Supply, which headquarters in Tulsa.

Forrest Warren was transferred from his store manager's position at Harvey, La. to replace Williamson as city salesman in Houston. Paul Condit was promoted to store manager at Harvey.

A. P. Taylor is appointed

... sales manager of Wire Rope Corp. of America, Inc.'s Shreveport district. He will be in complete charge of the Shreveport warehouse and sales office. Taylor's responsibilities will include service for Wireco Brown Strand products.

Metering separator to be sent

... to Libya from Rolo Mfg. Co., Houston. The 60-in. o.d. by 21-ft. Rolo Hi-Cap unit is capable of separating and metering up to 40,000 bbl. of crude oil and gas daily. Inspecting

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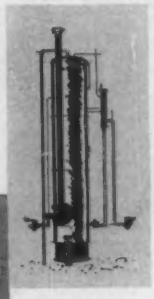
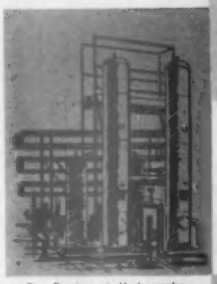


Separators



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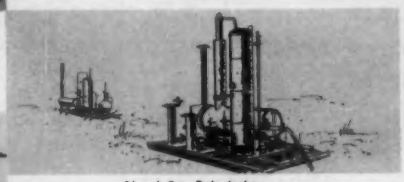
Tysco process equipment pays out faster...



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- Custom-installed for consistent high performance.

All Tysco equipment is job-designed. Final assembly on process equipment is completed only after a thorough investigation of your particular production problem. Installation and service hook-up are made to accommodate the long-range plans of your lease. And, you are always assured of expert service by Tysco's dependable service crews.

Whatever your requirements—a single unit or a complete lease system,—Tysco oil and gas process equipment will give you a higher return on your investment.

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the unit in Rolo's Houston plant prior to export are, from left: W. L. Henry, vice president of manufacturing; V. E. (Bob) Smith, sales manager; and R. K. (Bob) Franklin, president.

Cooperative research program

. . . on water flooding and crude-oil production and refining problems has been announced jointly by Dr. G. H. Rohrbock, president of Magna Products, Inc., Santa Fe Springs, Calif., and W. F. Mitchell, vice president and general manager of Chemical Division, General Mills, Inc., Kankakee, Ill.

Applications work will be carried out in Magna Products' new research facilities at Santa Fe Springs, supplemented by long-range support work by General Mills Research.

Ballentine named chief engineer

. . . for Southern Pipe Division of U. S. Industries, Inc., Azusa, Calif., according to Douglas A. Stromsoe, division president. He will be responsible for research and development, inspection, industrial engineering, and plant engineering functions.

William I. Ballentine, Jr., comes to Southern Pipe after 10 years with U. S. Steel's Consolidated Western Steel Division, where he served as manager of research and development and as general supervisor of research and development services.

Browning-Ferris officers check

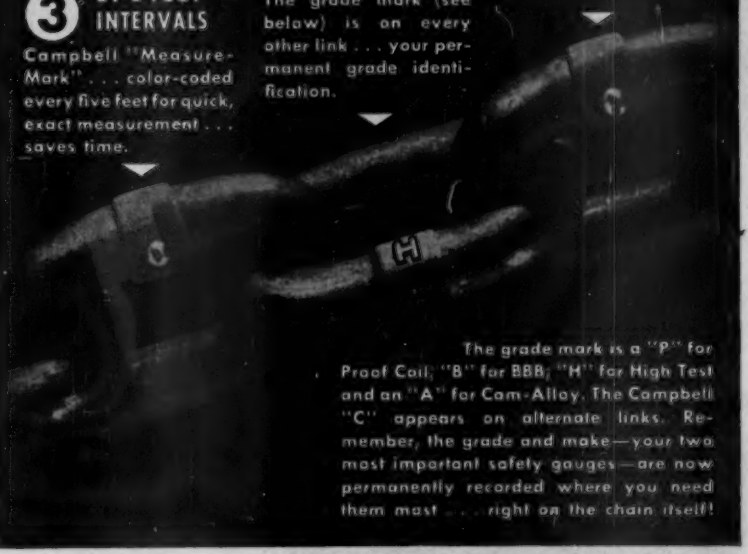
. . . a new 230 hp. TD-25 International Harvester tractor featured during Browning - Ferris' recent open house held in Dallas and Houston. The company distributes heavy equipment around the world. Shown beside the tractor are, from left: Mack Noblitt, vice president; Doyle Mowrer, assistant plant manager; and Mitchell Deane, executive vice president.

CAMPBELL HALL-MARK CHAIN identified . . .

1 BY MAKE
The Campbell "C" is permanently in relief on every other link . . . your Campbell identification.

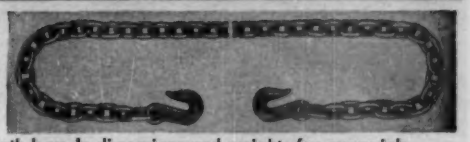
2 BY GRADE
The grade mark (see below) is on every other link . . . your permanent grade identification.

3 BY 5-FOOT INTERVALS
Campbell "Measure-Mark" . . . color-coded every five feet for quick, exact measurement . . . saves time.



The grade mark is a "P" for Proof Coil; "B" for BBB; "H" for High Test and an "A" for Cam-Alloy. The Campbell "C" appears on alternate links. Remember, the grade and make—your two most important safety gauges—are now permanently recorded where you need them most . . . right on the chain itself!

BOOMER CHAINS



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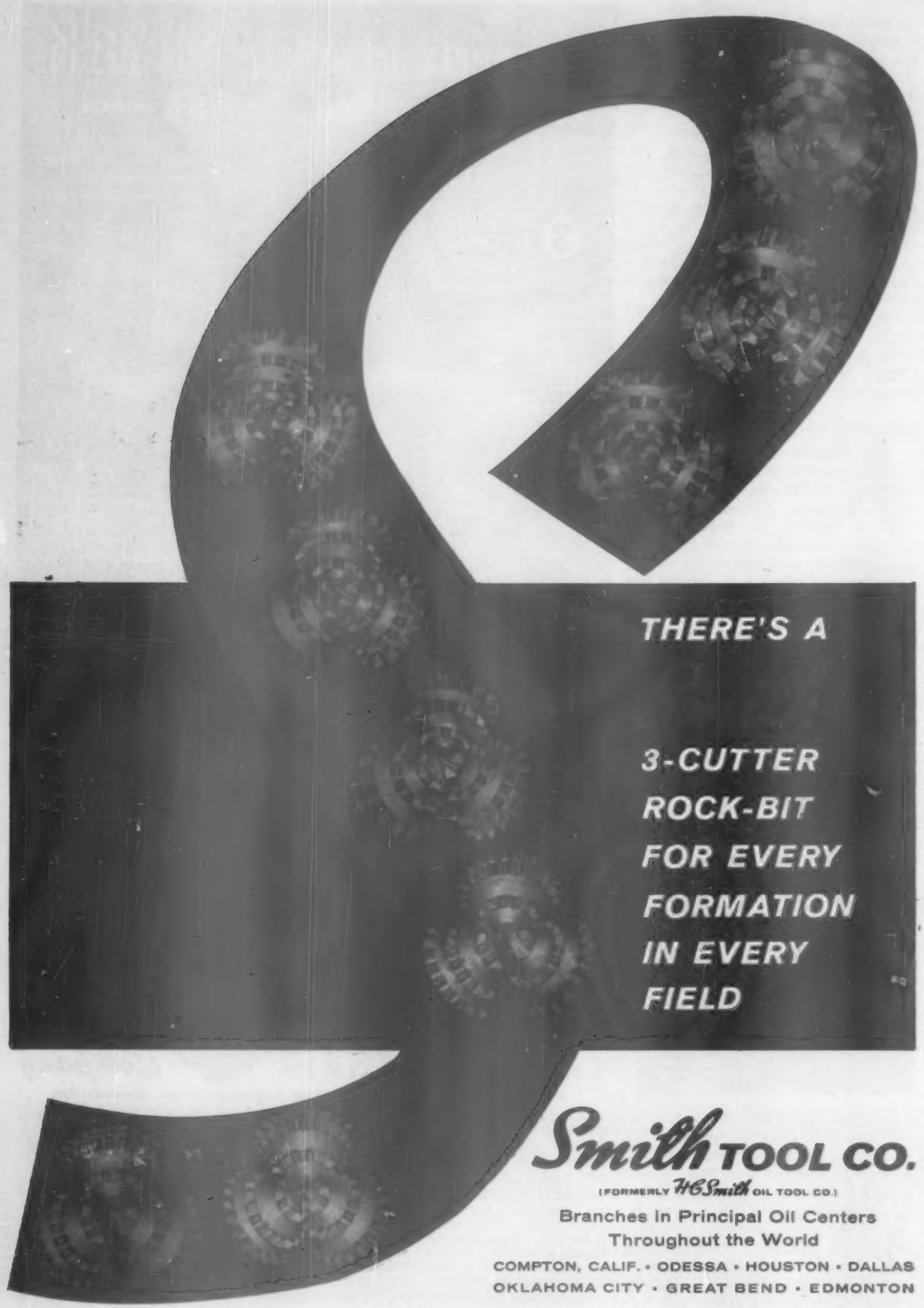
CONTACT ANY OF THE CAMPBELL REPRESENTATIVES ABOVE FOR COMPLETE INFORMATION.



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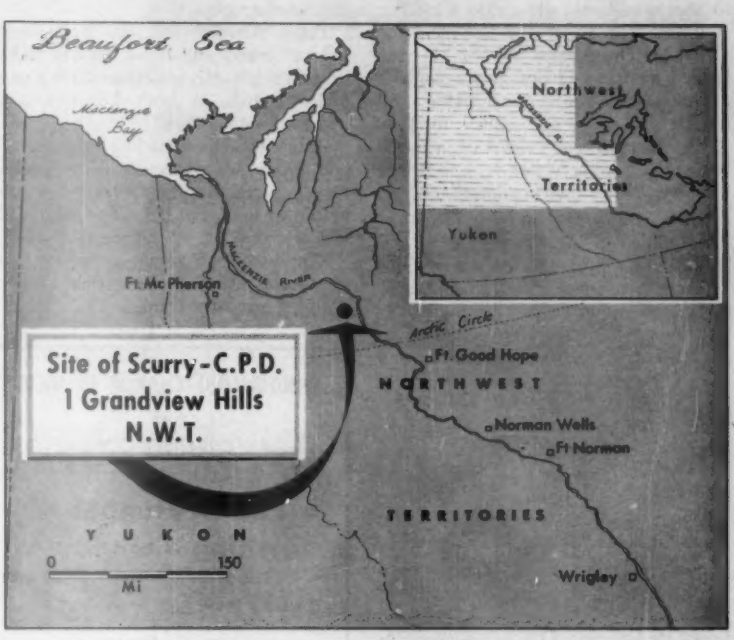

THIS FAR-NORTH Arctic operation will test a big province in Northwest Territories.

It's time to look north

NOW IS THE TIME to drill in the Arctic. Why? On frozen ground it is easier to move the heavy drilling equipment into the remote areas.

After months of planning, Pete Bawden Drilling, Ltd., Calgary, is ready to start a test 50 miles north of the Arctic Circle in the Northwest Territories for Scurry-C.P.D. et al. Proposed depth for this venture—the 1 Grandview Hills N.W.T.—is 6,000 ft. Bawden's rig 16, a modified Oilwell 64B, is rated for 8,500 ft. It can go deeper if necessary by using smaller drill pipe.

. . . A long way north is the site, but not the farthest north ever drilled. Wells in Alaska have been completed at Gubik and at Umiat in Naval Petroleum Reserve 4 at least 150 miles nearer to the pole. It will be the farthest-north operation in this part of Canada. The geographical position of the Arctic well, is Lat. 67° 5' N. and Long. 130° 58' W., or 150 miles northwest of Normal Wells, 84 miles northwest of Fort Good Hope, and 17 miles west of the Mackenzie River. It lies 200 miles east-northeast of the Western Minerals et al. 1 Chance discovery in Yukon, an 8-M.M.c.f.d. well which made news in August.

Cost cut on long haul . . . Two transportation choices were possible—air or river, or a combination of both. By use of preplanning costs were cut significantly in using the Mackenzie River as a supply artery. The initial staging area was the town

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of Hay River, N.W.T., on Great Slave Lake. There the barges were loaded for the long trip down the Mackenzie to the river-bank site Little Chicago, 17 miles crow-flight distance from the well site. On August 20 the rig was loaded on trucks from its former site 30 miles from Spirit River, Alta., and hauled by road 550 miles to Hay River where it was loaded on a barge for the 778-mile water trip to Little Chicago down the Mackenzie River.

After unloading on river bank at Little Chicago, the rig will be carried overland on 20 miles of newly built roads. The unloading site, Little Chicago, was prepared in advance of arrival where cats, steel tanks, and Caterpillar lift trucks were unloaded weeks before. Considerable difficulty was encountered at the unloading site because the unfrozen ground turned to mud where the permafrost had melted. From river bank to drill site the terrain consists of small lakes, muskeg, and in part bushy rolling country that would support heavy loads only when frozen.

The use of the Mackenzie River barges saved considerable cost compared to air lift. The barge trip was unusually late in the year for the heavy loads that were shipped. Before freezeup the river is generally low and obstacles were experienced in shallows, rapids, and other low-water hazards.

Well Planned

The timetable was well planned and executed. On August 20 the rig left its former site, and on September 1 loading operations began for the 1,700 tons of drilling equipment required. A week later the barges were loaded and towed across Great Slave Lake to Wrigley Harbor. Upon the arrival of the tug, Radium Charles, the barges left Wrigley Harbor on September 17. Two days later more barges were loaded with over 97,000 gal. of diesel fuel at Norman Wells, along with cat and truck fuel. Aviation gas also was loaded which was to be used on the Bawden DC-3 air freighter. Use of the plane was planned to service the drilling operation on scheduled weekly flights during the winter.

The barges arrived at Little Chicago on September 21. The total distance from former drill site near Spirit River to the Arctic location was 1,300 miles.

What the test will tell . . . Oil men and drilling people will be watching the Arctic test in an effort to gain new information on cold-weather drilling techniques. Geologists will benefit from the data disclosed on the stratigraphic sequence. The site was chosen on surface geology, and it is possible that 6,000 ft. may not reach the ultimate objective.

Peter Bawden will use pretrained Eskimo crews and has a human stake in the results. His experiment may pay high rewards in both business and personal satisfaction.

After beach unloading, rigging-up operations are expected to require a week's work. Drilling conditions are unknown here, but it is hoped the well can be completed by spring breakup.

This well may prove to be the key to future drilling operations in the Arctic region of Canada.

ANNOUNCING CHANGE IN NAME
From
DOAK DRILLING COMPANY
To
Shaw-Hughes Drilling Company
P. O. Box 1108 Bristow, Oklahoma
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President
Wm. M. Hughes
V. P. & Gen. Mgr.
Elmer Cathey
Toolpusher

Earlier this year, the company acquired the one-third interest owned by Howard J. Doak, and the name is being changed to now show correct ownership. Shaw-Hughes Drilling Company, under the same management, will continue to operate with the same rigs and equipment, personnel, supervision, and policy. We shall try, as always, to give top performance in efficiency and cooperation.

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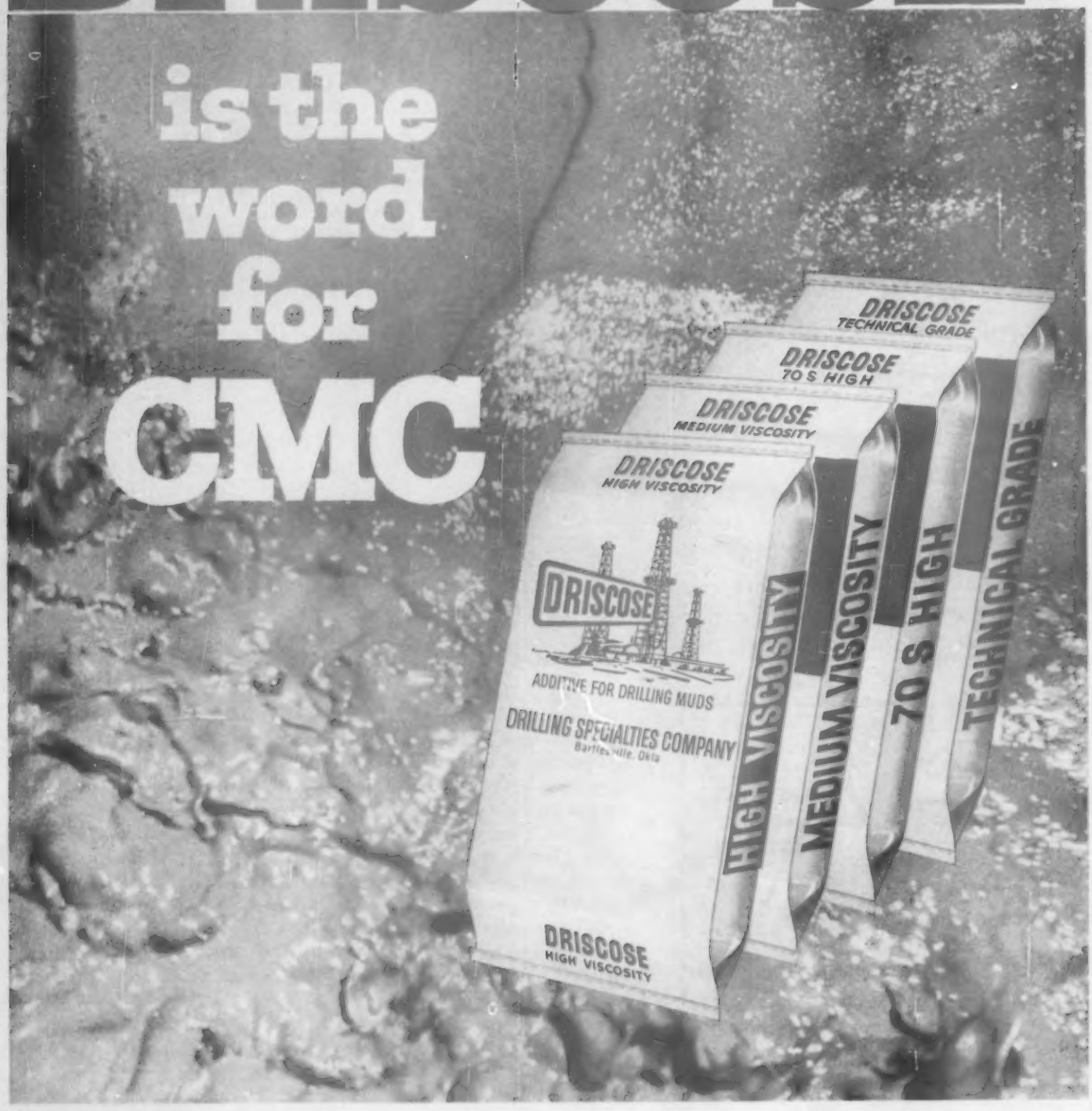

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A 480-BBL. OIL WELL on the crest of the Las Animas arch is the best success ever registered in southeastern Colorado. Frankfort Oil Co. 1-9 State, in the McClave field area, is expected to stimulate an active wildcat campaign in the region. (Contours on top Permian adapted from USGS Oil and Gas Investigations Map OM 135).

Las Animas arch finally hits the big time

BY FRANK J. GARDNER

AFTER 7 YEARS of on-again, off-again exploration, the Las Animas arch country of southeastern Colorado now stands on the threshold of a new era of big oil. Since 1952, the region has been of passing interest to large and small operators alike. But nothing has happened to start the drilling campaign that it deserves.

Now this may change. But slowly. For this is strat-trap country, and campaigns always sputter and spit in such environment. The only thing needed to put zip into the search is a really significant discovery.

A big oil well . . . The necessary zip came to Las Animas last week, when Frankfort Oil Co. revealed a 20-bbl. per hour flow of high-gravity oil at its 1-9 State, Section 9-21s-48w, Bent County, Colorado. Lying 2 miles south of the small McClave gas field in Kiowa County, this important strike is producing from 10 ft. of Morrow-Pennsylvanian sand at 4,744-54 ft. Tests of the well have rated gages varying from a low of 60 bbl. in 6 hours to a high of 170 bbl. in 8 hours, using ¼-in. choke. Acidization and fracturing preceded the tests.

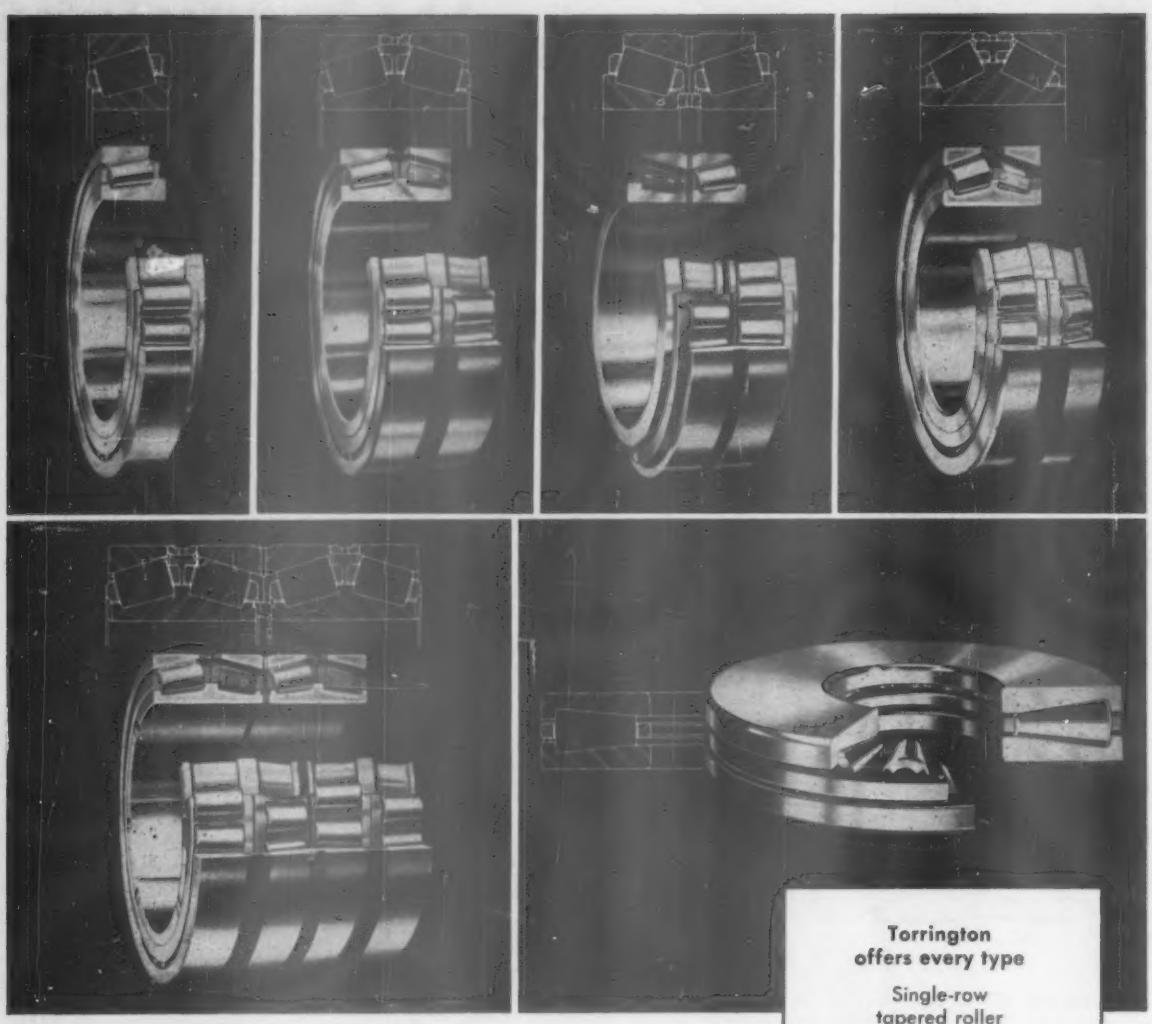
The Las Animas arch has been an enigma to explorationists since the earliest days of Rocky Mountain oil. In February 1954, at the fourth annual meeting of the Rocky Mountain section of the AAPG in Albuquerque, it was spotlighted as one of the "unconquered frontiers" of the search for oil.

In gas country . . . In 1952, Continental had completed a small noncommercial gas well southwest of Eads in Kiowa County, with a flow of 357 M.c.f. per day from Morrow at 4,870-90 ft. Other wildcats along the arch had had small shows of both oil and gas. But it was not until July 1955 that the first real production was found; this was the discovery of Bent's Fort field. M. J. Stansbury 1 Cordes & Oberlander (Bent County) was finished for 50 bbl. of oil and 440 M.c.f. of gas from the Cherokee-Pennsylvanian at 4,632 ft.

The Bent's Fort find caused a pronounced increase in drilling along Las Animas during 1956. And two new gas fields were found that year . . . Lubers in Bent County, and Colt in Kiowa County. Harrington's 1-A Earl opened Lubers field about 5 miles southeast of Bent's Fort, with a flow of 2,150 M.c.f. per day from Atoka-Pennsylvanian at 4,331-43 ft. Colt field was discovered by Pan American Petroleum Corp. (Stanolind) 1 Bolten-Lamberson, a Morrow producer at 5,294-5,304 ft.; it made 1,792 M.c.f. per day on potential test.

Moving into the McClave area in earnest in 1957, Harrington established three major extensions to the field; one, the 1-A State, was a Morrow gas well. The other two, one oil and one gas, opened Marmaton-Pennsylvanian production for the first time in the field. The oiler was the 1-A Lynn, Section 13-20s-49w, formerly a Continental operation; it made a pumping potential of 240 bbl. daily from sand at 4,232-54 ft. and was the sole oil well in the field until the current Frankfort strike at 1-9 State.

Signals a new era . . . This new oil well (1-9 State), producing nearly 500 bbl. per day, is the signal for major wildcat campaigns up and down this old arch. The wildcat density, considering the area involved, is nil. The lack of subsurface data, an essential element to strat-trap prospecting, will retard the search. But to drill is to discover, and drilling we shall see.



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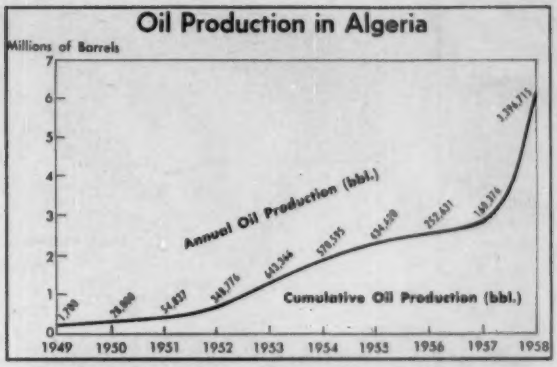
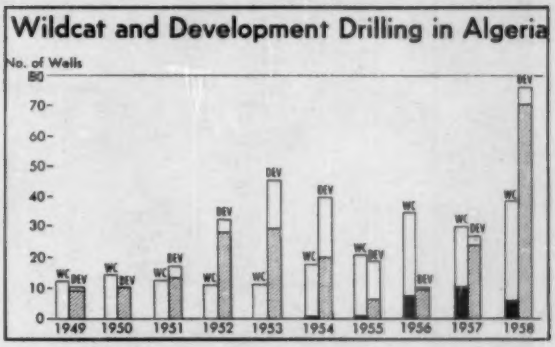
BY PETER B. BIKE
Geophysical Editor

Algeria comes alive as oil producer

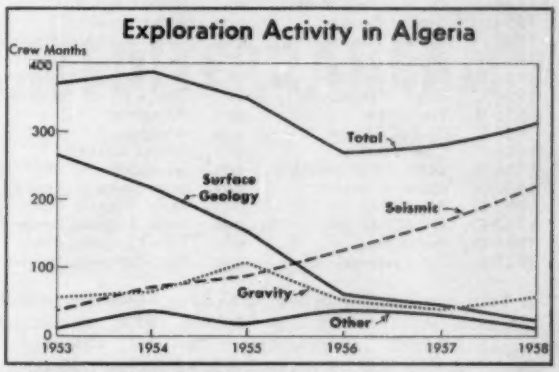
After a false start, this North African nation is a big new oil frontier.



PLOTTED cumulative oil production had a sharp increase in 1958. Amounts above the line are annual production figures.



TOTAL NUMBER of wildcat and development wells are plotted on bar graphs. Solid black and shaded portions of the bars indicate success of wildcat and development tests. In 1957, for instance, there were 30 wildcats drilled, of which 10 were successful (black). Of 27 development attempts, 24 were producers (shaded).



SURFACE GEOLOGY surveys have given way to increased seismic effort. Exploration methods have paid big dividends in Algeria.

ALGERIA was a sleeping giant in 1948—with no sign of rousing. Notoriously a one-field nation with oil production since 1904, the outlook was pretty grim. The lone producing field, Tliouanet, was on a sharp decline curve. Much of the country is desert and to explorationists the Algerian Sahara was about as appealing as granite-shield country.

By mid-1948, the Tliouanet field on the southwest edge of the Chelif basin had yielded only 200,000 bbl. since its discovery in 1914. During the first 6 months of 1948 only 220 bbl. had been obtained from this middle Miocene reservoir. The crude was high-gravity (45°) but production was falling off fast.

Was Algeria to continue as a one-field province? The history here was monotonously repetitious. In the northwest sector of the Chelif basin, the Ain Zeft field had lasted but 10 years (1904-1914) and gave up only 10,000 to 20,000 bbl. of heavy crude from the Upper Miocene sands at a depth of 1,000 ft.

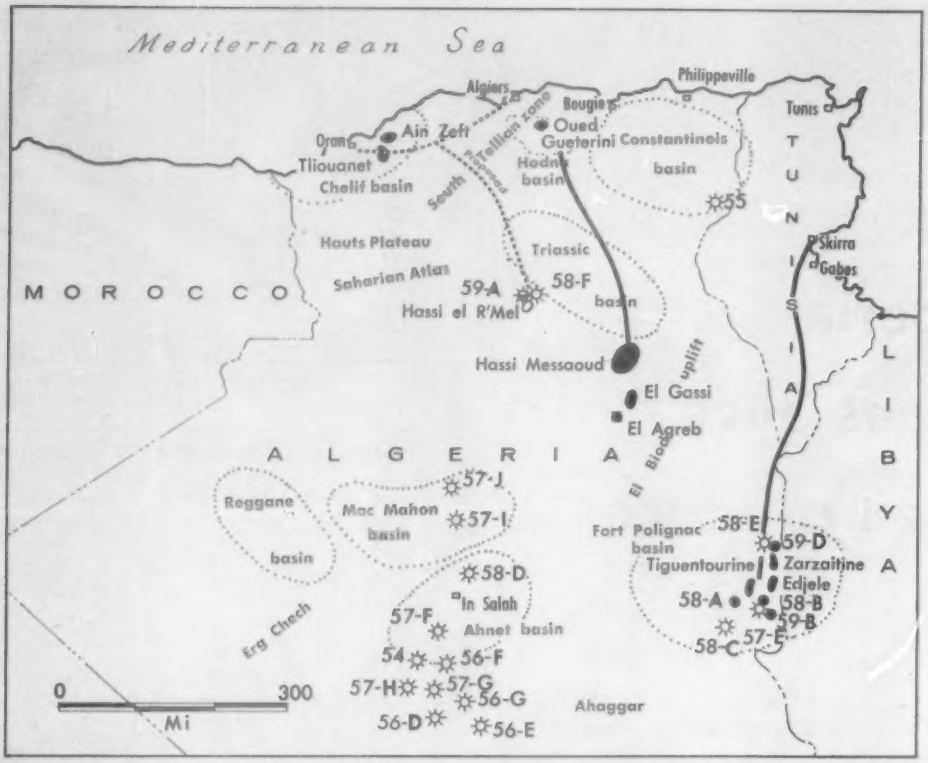
Surely a country of 852,600 sq. miles, the size of Texas and Alaska combined, should hold greater promise than past performances have indicated; but when would fulfillment come?

. . . A year of hope was 1948, following the discovery of the Oued Gueterini field in the Hodna basin, 90 miles southeast of Algiers. Although completed late in the year, it was a sign of better things to come. The next year saw 10 shallow development wells dug here for a total footage of 10,640 ft.; only one was dry. Three pay horizons were found in the pool, two shallow ones in the Eocene and a deeper one in the younger Miocene. The average grade of the oil was 37°, and 1,700 bbl. were taken out.

Twelve wildcat wells were completed in 1949 and 11 of these in the Miocene-Pliocene Chelif basin had shows. All were abandoned.

Exploration and drouth . . . Success at Oued Gueterini launched the exploration that followed. In 1950, there were 14 wildcat ventures completed in the Chelif basin and all were dry. Conversely, 10 exploitation operations in the Hodna basin found oil.

The next year, 1951, saw a stepup



THIS MAP of Algeria shows the geological provinces and areas of activity. Pipelines, existing and immediately proposed, are a critical factor in the nation's economic growth. The key to the oil and gas strikes are listed below.

Date	Field or well	Type	Location
1904	Ain Zeft	oil	Chelif basin (abd.)
1914	Tliouanet	oil	Chelif basin (abd.)
1948	Oued Gueternini	oil	Hodna basin
1954	Djebel Berga	gas	Ahnet basin
1955	Djebel Foua	gas	Constantinois basin
1956 A	Edjele	oil	Fort Polignac basin
1956 B	Tiguentourine	oil	Fort Polignac basin
1956 C	Hassi Messaoud	oil	East Central Sahara
1956 D	Tibardine	gas	Ahaggar
1956 E	Djebel Thara	gas	Ahaggar
1956 F	Oued Djaret	gas	Ahnet basin
1956 G	Djebel Mouahdrine	gas	Ahaggar
1957 A	Hassi el R'Mel	gas	near Triassic basin
1957 B	SN REPAL HR-2	gas	near Triassic basin
1957 C	SN REPAL HR-3	gas	near Triassic basin
1957 D	Zarzaitine	gas	Fort Polignac basin
1957 E	Tin Essamed	gas	Fort Polignac basin
1957 F	Tirechoumine	gas	Ahnet basin
1957 G	Meredoua	gas	Ahaggar
1957 H	Bahar el Ahmar	gas	Ahaggar
1957 I	Tineldjame	gas	Mac Mahon basin
1957 J	Krebcha	gas	Mac Mahon basin
1958 A	El Adeb Larache	oil	Fort Polignac basin
1958 B	Ouan Taredert	oil	Fort Polignac basin
1958 C	Assekaifaf	gas	Fort Polignac basin
1958 D	In Salah	gas	Ahnet basin
1958 E	In Amenas	gas	Fort Polignac basin
1958 F	Tilrhent	gas	near Triassic basin
1959 A	Bordj	oil	North of Hassi el R'Mel
1959 B	Dome A Collenias	oil	Fort Polignac basin
1959 C	El Gassi	oil	El Biod uplift
1959 D	El Agreb	oil	El Biod uplift
1959 E	Ouan Taredjeli	oil	Fort Polignac basin

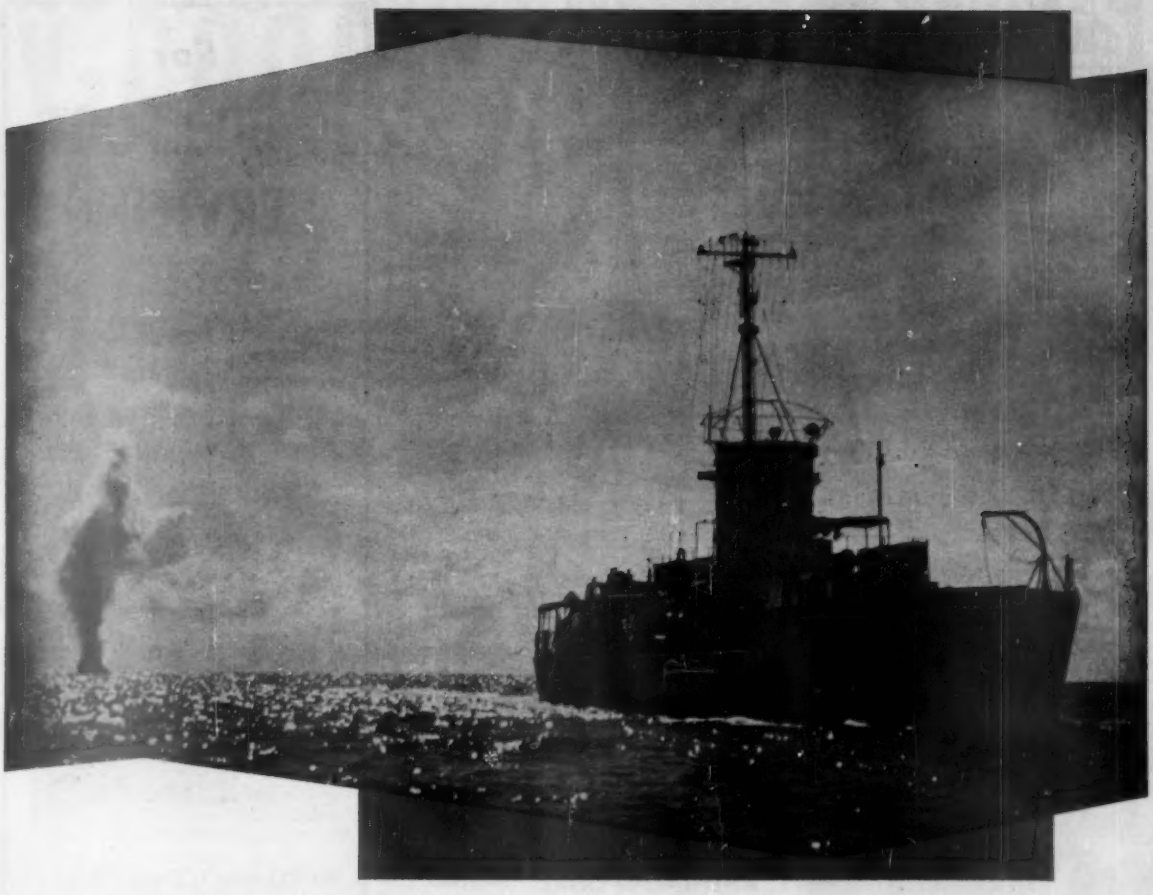
in both development drilling and exploration surveys. Random drilling waned slightly. Activity began to spread to new areas. Principal operators were Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN REPAL), Societe des Raffineries Algeriennes (SRA), and Societe des Petroles d'Aumale (SPA). The latter was owned jointly and equally by SN REPAL and SRA, with SN REPAL operating. Sectors of interest were the Hauts Plateau, Atlas Saharian, Constantinois basin, and for the first time, farther into part of the Sahara. Previously, the fringe of the desert was the deepest lateral penetration into the sandy wastes.

All the drilling in 1951 (99,308 ft.) was done by SN REPAL. At Oued Gueterini, which was controlled by SPA, production approached 56,000 bbl. The crude stored in Algeria was being shipped to France for processing. Development wells totaled 17; oil 12, gas 1, and 4 were abandoned. All 12 exploratory holes were noncommercial.

In 1952, SN REPAL stepped up its exploration program and conducted work in Chelif basin, South Tellian zone, Hodna basin, and Constantinois basin—all in northern Algeria. Some work was done in the Sahara. Of the country's total production of 348,776 bbl., all but 38 bbl. came from Oued Gueterini field. Two new companies, Compagnie de Recherche et d'Exploitation des Petroles au Sahara (CREPS) and Compagnie des Petroles d'Algerie (CPA), entered the scene with concession grants, making a total of five operating firms. The 11 wildcats drilled were failures, and of 32 development attempts, 28 had oil, and 4 were dry.

... **In 1953,** the oil flow at Oued Gueterini hit a peak of 643,366 bbl. and constituted all of the nation's output. A total of 11 outpost wells were failures and of 45 development wells in the lone oil field, 29 were oilers. Exploration was spreading to widely scattered areas. Why not? Competition was increasing.

The door was opened in 1954 with the first gas well in the Algerian Sahara at the Djebel Berga anticline southwest of In Salah. A Lower Devonian section drilled by CREPS test-



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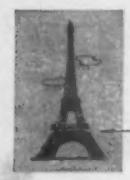

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ed over 21.2 M.M.c.f. at 8,461 ft. This was the only successful completion in 18 starts. Half of the stepout wells drilled at Oued Gueterini were oil wells. Another apparent gas discovery which was still going deeper at year end occurred at the Djebel Foua anticline in the northeast corner of the country near the Tunisian border. In exploration, 1954 marked the year of the big push into the Sahara. Of all survey methods, surface geology led, followed by increased seismic efforts.

French Had Troubles

Politically, the French had their troubles in 1954, and this left its mark on the over-all production picture. The Algerian rebellion got into full swing and was spurred by a nationalist movement that ultimately claimed an annual toll of 12,000 casualties and cost the French $2 billion a year. This was to continue for nearly 5 years.

... Things came alive in '55 with emphasis on the Sahara. Only 1 out of 22 exploration ventures proved to be a discovery; gas found at Djebel Foua by SN REPAL was completed for 17.6 M.M.c.f. at 2,953 ft. Two confirmation offsets to the 1 Foua were abandoned. Six out of the 19 field tests found oil.

Areas worked during the year included South Tellian zone, Hodna basin, Constantinois basin, and the Sahara. Total exploration survey work was off from the previous year.

Oil shows at Edjele were indicated in a drilling well.

... Algeria's golden year was 1956 with 3 oil discoveries and 4 gas strikes out of 35 exploratory tests. The new oil fields were:

Edjele field, CREPS 101 Edjele, located in the southeast Sahara in Fort Polignac basin, produced 130 bbl. daily from the Lower Carboniferous sands; total depth was 2,890 ft. Of four development wells at Edjele, three were productive.

Tiguentourine field, CREPS 101 Tiguentourine, in the southeast Sahara in Fort Polignac basin, produced 500 bbl. daily from the Lower Carboniferous sands. The well was completed at total depth 1,903 ft. An offset well also was successful.

Hassi Messaoud field, SN REPAL 1 Hassi Messaoud, in the northern Sahara near Ouargla flowed light oil from a 459-ft. section of Triassic sand at 10,925 ft.

The 1956 gas strikes were:

CREPS 1 Tibardine in Ahaggar south of In Salah flowed 5.3 M.M. c.f.d. gas from Lower Devonian, total depth was 8,294 ft.

CREPS 201 Djebel Thara, southeast of In Salah, tested 5.1 M.M.c.f.d.

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gas from Ordovician, total depth was 4,058 ft.

CREPS 1 Oued Djaret, east of Berga field, flowed 6 M.M.c.f.d. gas from Lower Devonian, total depth was 9,603 ft.

CREPS 102 Djebel Mouahdrine, northwest of the Thara well, gaged 1.8 M.M.c.f.d. gas from Ordovician, total depth was 3,924 ft.

SN REPAL 1 Hassi el R'Mel, near Triassic basin, indicated a wet-gas discovery in the Triassic sands; the well was still drilling at year end.

Nine of ten development wells were successfully completed during the year. With the discovery of three new oil fields, the total number of fields in the country was four, and for the first time in Algerian history the nation was not dependent upon a single field.

...No new oil was found during 1957 but 10 additional gas-well discoveries were made. Plans were made for Compagnie des Transport Pipe-Lines au Sahara (TRAPSA), an affiliate of CREPS, to build a 16-in. pipeline from the Zarzaitine region to the Mediterranean shore, to transport the crude coming from structures discovered in Fort Polignac basin. Another pipeline, a 6-in. system, was constructed to carry crude from Hassi Messaoud field to Touggourt, to handle 7,548 bbl. a day. The crude would then go from Touggourt to Philippeville by rail.

Seven new concessions were granted during the year. The bulk of development was at Edjele, and most of the footage drilled was for wildcats which comprised over half the total footage drilled.

The 10 gas discoveries were:

SN REPAL 1 Hassi el R'Mel near Triassic basin produced gas from the Lower Triassic sands; total depth was 7,464 ft.

SN REPAL 2 Hassi el R'Mel, 9 miles southwest of the HR-1, tested gas in a zone near the top of the Triassic in another zone.

SN REPAL 3 Hassi el R'Mel, 12 miles north of the HR-2, encountered gas at 7,132 ft. in the Triassic at a lower zone than the HR-1.

CREPS 101 Zarzaitine, north of Edjele in Fort Polignac basin flowed gas; total depth was 4,108 ft.

CREPS 1 Tin Essamed, southwest of Edjele flowed gas; total depth was 4,806 ft.

CREPS 1 Tirechoumine, south of In Salah, produced gas; total depth was 8,248 ft.

CREPS 101 Meredoua also in the Ahaggar region, flowed gas; total depth was 4,655 ft.

CREPS 301 Bahar, southwest of In Salah, gaged gas; total depth was 5,180 ft.

CPA 1 Tineldjame in central Sahara, flowed 12.3 M.M.c.f.d. from the basal Carboniferous sands; total depth was 6,239 ft.

CPA 1 Krebcha gaged 6.35 M.M. c.f.d. from the basal Carboniferous sands; total depth was 6,287 ft.

The development wells totaled 27, of which 22 were oil, 2 were gas, and 3 were abandoned.

In short, Algerian activity in 1958 was booming. Some 19 new companies entered the Sahara, and these included 12 French, 2 American, and 1 Italian. Twenty-six new concessions were granted in the desert. Production at Hassi Messaoud boosted the yearly production to 3.5 million barrels. There was new interest in the Cambro-Ordovician reservoirs. In new oil strikes, four were indicated, and two of these were completed before the end of the year.

In wildcat activity, the two oil strikes were bolstered by four gas finds. Oil was found at Zarzaitine following the 1957 discovery of gas there. The oil discoveries completed in 1958 were:

CREPS 1 El Adeb Larache, southwest of Tiguentourine field, had ini-

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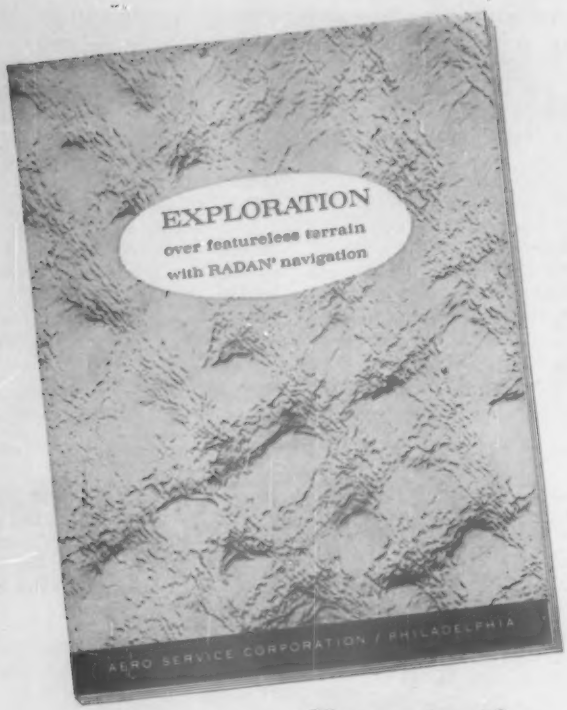

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tial potential of 1,500 bbl. per day at 4,920 ft.; total depth was 8,198 ft.

CREPS 1 Ouan Taredert, southwest of Edjele field, found oil in the Cambro-Ordovician sands; total depth was 5,421 ft.

Gas strikes included:

CREPS 1 Assekaifaf, southwest of Tiguentourine field; total depth was 6,469 ft.

CREPS 1 In Salah in Ahnet basin; total depth was 8,167 ft.

CREPS 1 In Amenas, northwest of Zarzaitine; total depth was 4,068 ft.

SN REPAL 1 Tilrhent, north of Hassi el R'Mel near Triassic basin; total depth was 9,804 ft.

Work started on a 24-in. pipeline from Edjele to the Tunisian port of Skirra. Total footage drilled was 736,643 ft., most of which was for development. The bulk of the work done (283,355 ft.) was at Hassi Messaoud. At Zarzaitine, 13 wells were completed with 12 producing in the Carboniferous and Devonian. This field had a proven area of approximately 10,000 acres.

At Hassi Messaoud, 19 of 20 wells were completed and 13 were still drilling at year end. Productive area is believed to be approximately 250,000 acres.

At Hassi R'Mel, the wet-gas reservoir is estimated to have a productive area of 500,000 acres. Development was suspended here waiting for a trans-Mediterranean pipeline which was proposed to carry the crude to West Europe. Eight potential gas wells were completed. There were more concessions let during the year—40 in all, with 19 pending.

In the Sahara, 26 concessions were granted in 1958 covering over 43 million acres. This year saw the promulgation of the Sahara Petroleum Code which made provisions for a 50-50 participation of profits. Another ordinance contemplated involved the immediate distribution of all geological and geophysical information, excepting seismic data.

Algeria in 1959 . . . The Sahara proved to be a fertile hunting ground for oil finders this year. Look what has happened:

Hassi el R'Mel, which had been a wet-gas area, entered the ranks of oil fields with the completion of SN REPAL 2 NLI Bordj in January. At 8,200 ft. in the Triassic sands, the well flowed 50 bbl. an hour. Previous gas in this area came from 7,500 ft.

CREPS 1 Dome A Collenias, 28 miles south of Edjele field in Fort Polignac basin, made 31 bbl. hourly from Ordovician at 3,175-3,230 ft. and 35 M.c.f. gas with no water. This was the second January discovery.

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Societe Nationale des Petroles d'Aquitaine (SNPA) 1 El Gassi, 60 miles south of Hassi Messaoud field, flowed 2,500 bbl. daily from a 243-ft. Cambro-Ordovician pay at 10,400 ft. in March.

SNPA 1 El Agreb, 9 miles southwest of El Gassi discovery, produced oil at 11,600 ft. and no details were given on this September find.

CREPS 1 Ouan Taredjeli, 8 miles north of Zarzaitine field, found five possible pays from 2,100 to 3,180 ft. Hole was being deepened below 3,670 ft. in September. The oil zones tested 31, 6, and 14 bbl. hourly, and the other zones gave up gas of unstated amounts.

A 24-in. pipeline from Hassi Messaoud field to Bougie was completed in August. The 387-mile line will move 100,000 bbl. daily. Another supply line—a 24-in., 460-mile route—is under construction from the Zarzaitine region to Skirra, a Tunisian seaport on the Mediterranean.

Algerian future . . . Optimism reigns for the reserves yet unfound in the Algeria Sahara. The nation has come a long way since 1949. To date one company alone, CREPS, has developed 900 million barrels of recoverable reserves in the eastern sector near the Libyan border. Added pipeline facilities are now able to move the crude to markets. Further proposals are under consideration to build still more extensive transportation facilities to serve West Europe. The most ambitious program reported is to build pipelines under the Mediterranean Sea—10 to 40-in. lines—through Spain to France or other West Europe countries.

What about the reserves? Most conservative estimates of recoverable reserves are very encouraging for the nation's petroleum future. Look what some of them are (based on 20% recovery): Hassi Messaoud, 3.5 billion barrels; Edjele, 155 million barrels; Zarzaitine, 525 million barrels; and Hassi el R'Mel, over 30 trillion cubic feet of gas.

Production has reached significant proportions. During 1958 the total runs were nearly 3.4 million barrels. Exploration and competition have paid off. The Algerian giant has come of age during the past decade.

References

AAPG Bulletins July 1950 through July 1959, "Petroleum Developments in Africa" by Hollis D. Hedberg.

Michigan is active

In Michigan, Robert Bond 1 Van Antwerp, SE SE SE 19-20n-11w, Burdell Township wildcat, Osceola County, flowed 6½ bbl. oil per hour on 20/64-in. choke after 500 gal. acid treatment to Dundee pay at 3,678-83 ft. It appeared one of the best basin pool prospects of the year.

• William Albers 1 Smith, SW SW SE 30-1n-3e, Livingston County wildcat, tested good show gas and oil in the Squaw Bay zone at 1,200 ft. Wildcat originally was set up for 2,000 ft. but now will be tested at the 1,200-ft. zone.

• The Hanover play in Jackson County, at midyear viewed as the best new parallel trend prospect of the year in southern Michigan, continues to bring disappointment.

The ninth successive dry hole has been drilled into the Trenton-Black River, not only missing pay but any substantial section of dolomite. The play kicked off when Bell and Gault 1Bissell, 8-4s-2w, drilled a 100-ft. section of dolomite gas pay although missing oil. Latest failure was less than one-half mile west of the discovery. The play is 7 miles east of Pulaski oil pool.

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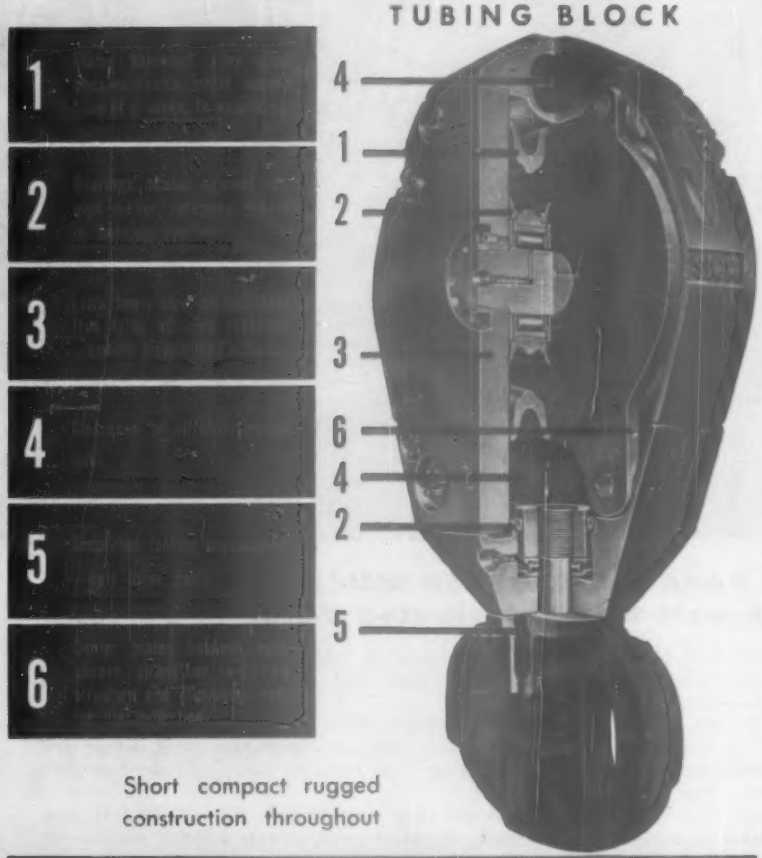

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Maine Prairie field extended in California

Amerada Petroleum Corp. brought in a good producer in the Maine Prairie gas field of Solano County with a well on the southwest edge of the field. Amerada completed the test in an interval at 6,146-60 ft. for 2,208 M.c.f.d. through a 3/16-in. choke.

Excellent extension for California's Los Medanos

McCulloch Oil Exploration Co. of California, Inc. continued its record of bringing in excellent wells in the Los Medanos-Port Chicago area of Contra Costa with an extension test 2,000 ft. northwest of the field discovery,. McCulloch's new well, 2 Mcculloch-Ginochio, tested at a rate of 8,300 M.c.f.d. from an undisclosed interval. The well total depth is 4,893 ft., however the discovery well to the south was completed in an interval at 1,665-1,708 ft.

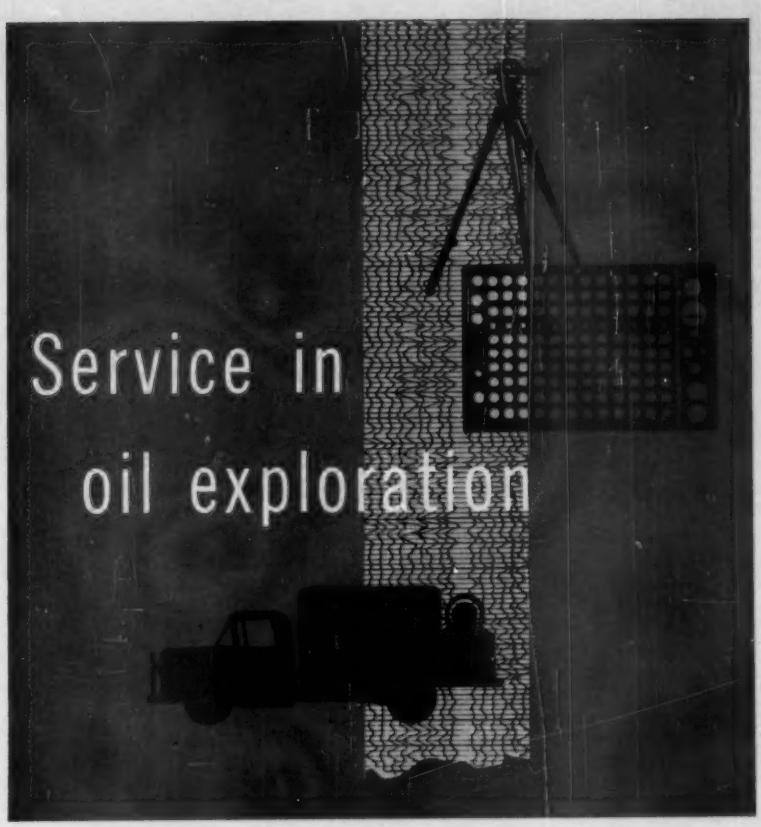
Offsets slated for big Rockies find

OFFSETS have been announced for the Rockies' big discovery of the year —Northwest Lisbon. Pure Oil 2 Northwest Lisbon-USA, NE NE N½ 14-30s-24e, 1½ miles southeast of the discovery well in San Juan County, Utah, will go to Cambrian at about 9,000 ft. This is the area's second offset announcement. Belco Petroleum Co. will go to 9,500 ft. at a wildcat 3¼ miles northwest of the discovery.

The San Miguel County, Colorado, Southeast Lisbon discovery well will also be offset by Pure. The 2 Southeast Lisbon, SW NW 8-44n-19w, ¾ mile southwest of the Mississippian gas discovery, first for Colorado, will try for the same. Location is 15 miles southeast of Northwest Lisbon. All wells are on the Lisbon Valley-Dolores anticline.

Hunton is new pay at Sooner's Flint Creek

New Flint Creek field in McClain County, South Central Oklahoma, has another pay, the Hunton lime of Siluro-Devonian age. Sunray Mid-Continent Oil Co. tested Hunton at the 1 Barger-B in C NE SE 1-5n-3w. Perforations at 7,674-86 ft. flowed 123 bbl. of new oil in 8 hours through several chokes. Then the well made 40 bbl. in 8 hours on 10/64-in. choke. The Hart sand yielded 50 bbl. new oil in 4 hours on 24/64-in. choke at 7,456-70 ft.



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Canadian drillers probe Cardium

THE CARDIUM SAND, known primarily in such fields as Pembina, Keystone, Lobstick, and Willesden Green in Central Alberta, is creating excitement in the southern portion of the province. Followup drilling in the Westcott district, about 35 miles northwest of Calgary and in the general Carstairs area, 30 miles northwest of the city, has recently proved very productive.

Although Westcott pool was discovered sometime ago it wasn't until recently that any development work took place. At Carstairs a discovery in the sand section was made a short time ago and production tests proved it quite prolific.

Westcott . . . The Westcott development is being carried out by Stekoll Oil & Gas, Ltd., partnership and to date four wells other than the discovery have been drilled. All of those have indicated Cardium sand success with the latest, although no production tested as yet, containing the thickest pay sector yet encountered in the area. It offsets the discovery well to the east and is ⅝-mile northeast of the first followup to the strike and a like distance southeast of the second. The discovery well found a 10-ft. net pay sector while the first followup contains 10 ft. of net pay and the second a 12-ft. net pay zone.

Stekoll is carrying out further work in the district at a 1½ mile north stepout attempt. That venture is scheduled to test the same horizon, around the 7,200-ft. level, and if successful could prove to be a real spark in other Cardium development in the south country.

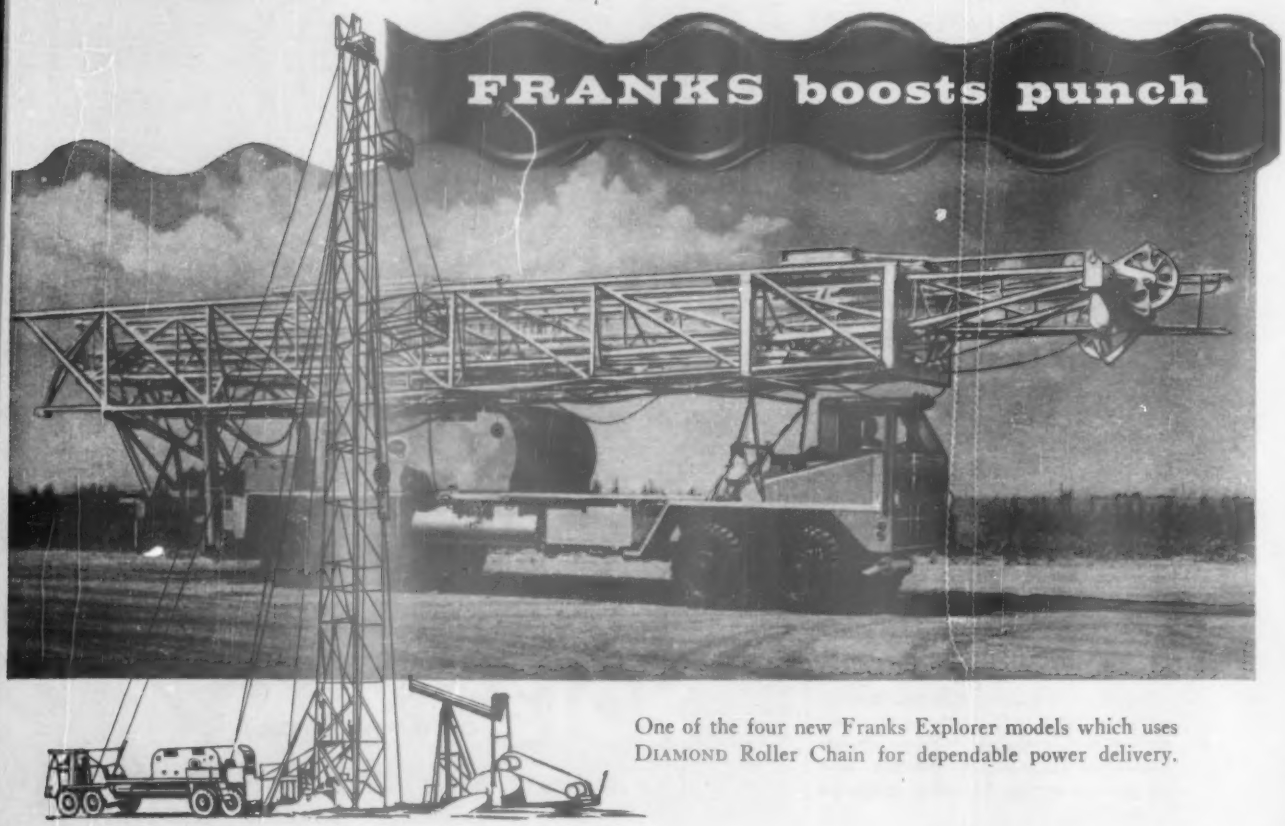
Carstairs . . . Turning now to the new discovery well. Green Oil of Canada (1958), Ltd., along with its parent North Star Oil, Ltd., Canadian Export Gas & Oil, Ltd., Provo Gas Producers, Ltd., and Alminex, Ltd., was the team responsible for it. Actually the well was drilled to the lower Mississippian horizon without success. After logs were run, however, the Cardium sand appeared to contain a pay zone and consequently casing was run to evaluate it. Perforations over a 13-ft. interval were made opposite the best-looking section and the well flowed the equivalent of 12.3 bbl. per hour or at the rate of 295 bbl. per day through restricted choke in this zone.

The well is Cree-CEGO 6-2-30-3 Carstairs, drilled on LSD 6, 2-30-3w5. It is 5 miles southeast of the Westcott development and 2 miles southwest of Mississippian gas production.

The Cardium sand section was contacted around the 6,630-ft. level and production casing was set to 6,725 ft. The interval perforated was between 6,631-43 ft. and actual production test followed an acid treatment of 500 gal. During the 13½-hour evaluation, 166 bbl. of 34° crude flowed to the surface through a ¼-in. choke.

The discovery team has not released details of followup drilling but it has been mentioned that another venture will be drilled by it in the vicinity in the near future.

First production in the Cardium sand in southern Alberta was encountered at the Shell Crossfield A13-2 venture 18 miles north of Calgary. It found a 9-ft. pay sector. Then Western Leaseholds discovered Cardium oil only 4 miles north of the city at its No. 8-34 Beddington well. However, neither of those have ever been followed up. The only other occurrence of Cardium crude in the southern part of Alberta is at Barrie Lake and there again only one well has been drilled.



One of the four new Franks Explorer models which uses DIAMOND Roller Chain for dependable power delivery.

Keystone drilling centers on Laurel Hill anticline

LATEST INFORMATION on the first Cambrian producer in Pennsylvania, Russell McConnell 1 Borst in Erie County, states that the well was acidized with 1,250 gal. in the Gatesburg sand.

Before acidizing, the well blew down to 250 M.c.f.d. The Trenton lime was found at 5,223-5,863 ft., the Glenwood at 5,863-88 ft., and the Gatesburg at 5,888-5,910 ft. The well is now blowing after acidizing. If this is a commercial well, it should stimulate considerable drilling in the area where most of the land has been leased up for some time.

Other Pennsylvania data . . . One of Manufacturers Light & Heat Co.'s wildcats in Fayette County was fractured. The well is still blowing after fracture. Another wildcat by the same firm in this area also found some gas in the Onondaga-Oriskany interval. It will be fractured. Two other wells are drilling in this area, both by the same company.

. . . Butler County. T. W. Phillips has plugged and abandoned his second Oriskany well in Butler County after fracturing in the Oriskany. The open flow after fracture was 550 M.c.f.d. and considerable salt water. The 1 J. R. Davis will probably end exploration in the immediate area of the two dry holes, but the area a few miles to the northeast looks good along the trend and companies are still holding considerable acreage.

. . . The 1 Halfast wildcat in Crawford County, being drilled by Alabaugh, has been shut down at 2,490 ft. The operator will wait until spring before resuming work.

. . . In the Rockton and Boone Mountain field areas of northwestern Clearfield County, there are 19 wells drilling. There are 10 wells drilling along Laurel Hill anticline in Fayette, Somerset, and Westmoreland counties. One of these wells is a new wildcat by Felmont Oil Corp. being drilled on State Game Lands Tract 42. This location is over 7 miles northeast of nearest production at Johnstown field. The well is in Clair Township, Westmoreland County.

. . . Potter County. Lee Minter et al. has just staked 1 Emporium Lumber Co. in Horton Township, about 1½ miles southeast of East Fork-Wharton field, Target here is the Oriskany sand.

. . . Susquehanna County. Kewanee Oil Co. is drilling the third wildcat in this county. The company's three wells are the first ever drilled in the county, which is located in the northeast corner of Pennsylvania. The first two wells were dry holes. The present wildcat found the Oriskany at 5,526 ft. with some gas shows. Well is shut down at 5,538 ft. for repairs, but a drill-stem test will be run.

. . . Warren County. Biery & Johnston 1 Frank Kapp in Limestone Township is shut down in the Silurian to case at 5,460 ft.

Panhandle wildcat flows Morrow Penn gas

Gas-condensate production was tapped at another of the many new pools being opened in Beaver County, Oklahoma Panhandle. The new discovery is Oklahoma Natural Gas Co. 1 Custer in C SW NE 31-2n-23eCM. The well, northwest of Elmwood field, flowed 5,400 M.c.f. per day with 5 bbl. condensate per million on one-point test at 7,402-21 ft. in Morrow. Open flow is calculated at 21 M.M. c.f.d.

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Actual case history . . .

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- *Increased bit life 67%.*
- *Increased footage per bit 170%.*
- *Increased penetration rate 66%.*
- *saved $9,000 in one interval.*

On another test, this one a slim-hole, "the average rate increased 45% and the footage-per-bit increased 86% in a single 800' interval. Ten fewer bits were used, and 122 less rig hours, for an estimated savings of $7,500."

And here's what the company said about $2,540 spent for a product specifically sold for bit lubrication: "No increase in bit bearing life or penetration rate was achieved. . . . On the basis of the test results (higher drilling costs with no improvement in bit life), further use was discontinued until more favorable results could be anticipated to justify the added expense."

Seeco-Mul, often run in so-called soap drilling fluids to lower the surface tension, is a chemical emulsifier with superior wetting abilities. In addition, Seeco-Mul is an efficient E-P agent. It deposits an extremely tough lubricating film that will withstand high pressure and successfully reduce metal-to-metal contact of the bearing surfaces in the bit.

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DRILLING PERFORMANCE IN 6¼" HOLE

Well No.	H-4	D-2
Type Mud	Seeco-Mul CMC low solids	CMC low solids
Interval	9,999-10,787	9,999-10,803
Footage	788	804
Bits	8	22
Rotary Hours	126	210
Rotary and Trip Hours	174	342
Weight	35	25
RPM	38 to 50	60
Feet Per Hour	6.3	3.8
Feet Per Bit	98.5	36.5
Hours Per Bit	15.8	9.5
Penetration Rate Increase	65.8%	—
Footage Per Bit Increase	169.9%	—
Cost Per Foot*	$11.20	$22.54
Mud Cost (including mud-up)	$1,470.00	$1,150.00

*Total rig time × $45 per hour + number of bits × $124.30 ÷ interval footage.

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Oklahoma's West Payne moves to the north

A north extension to West Payne field in McClain County in South Central Oklahoma is a Hunton lime Siluro-Devonian producer. The well is Gulf Oil Corp. 1 Josephine in C NW SE 7-5n-3w. The well flowed 556 bbl. of oil per day on 20/64-in. choke. Gravity is 43.7°.

Lindsay area . . . Kingwood Oil Co. 1 Harrison-A, NE SE 31-5n-3w, McClain County, flowed from three zones.

From Hart sand the well made 104 bbl. of oil in 24 hours on 14/64-in. choke; from Bromide 140 bbl. on 12/64-in. choke, and from Oil Creek 47 bbl. with 2,180 M.c.f.d. on 20/64-in. choke. Hart is Pennsylvanian, the other two pays are Ordovician.

McClain County's Flint Creek field grows

Three producers were added to fast-growing Flint Creek field in McClain County, South Central Oklahoma. Jones and Pellow Oil Co. 1 Baker, C NE SW 1-5n-3w, flowed 60 bbl. of oil in 10 hours on 13/64-in. choke from perforations in Hart sand at 7,488-7,514 ft.

The 1-B Baker in C SE NE 12-5n-3w flowed 90 bbl. of oil in 9 hours on 14/64-in. choke from Hunton lime at 7,568-78 ft. and is now testing in Hart sand. The 1-B Beabout, C NW NE 31-6n-2w, swabbed 5 bbl. of oil per hour from the Hart at 7,540-49 ft. Hunton got 4½ bbl. per hour.

Cleveland sand pays at Lincoln County wildcat

Central Oklahoma's Lincoln County has a new Cleveland Pennsylvanian sand oil pool at Earl E. Barnes 1 Wertman in C SE SW 12-15n-4e.

The well flowed 144 bbl. of oil per day on 14/64-in. choke from 2,892-2,902 ft. Gravity is 47°.

Two Ohio stepouts are successful

In Ohio two stepout completions were added to the successes in the oil play in southwest Richland Township, Holmes County, which is fanning out in several directions.

Initial production after fracture of Hoosier Drilling Co. 4 J. B. White, Section 17, was 250 bbl. oil with 150 M.c.f.d. Clinton sand was logged at 3,255-81 ft.

H. D. Collins 2 J. R. Weber, Sec-

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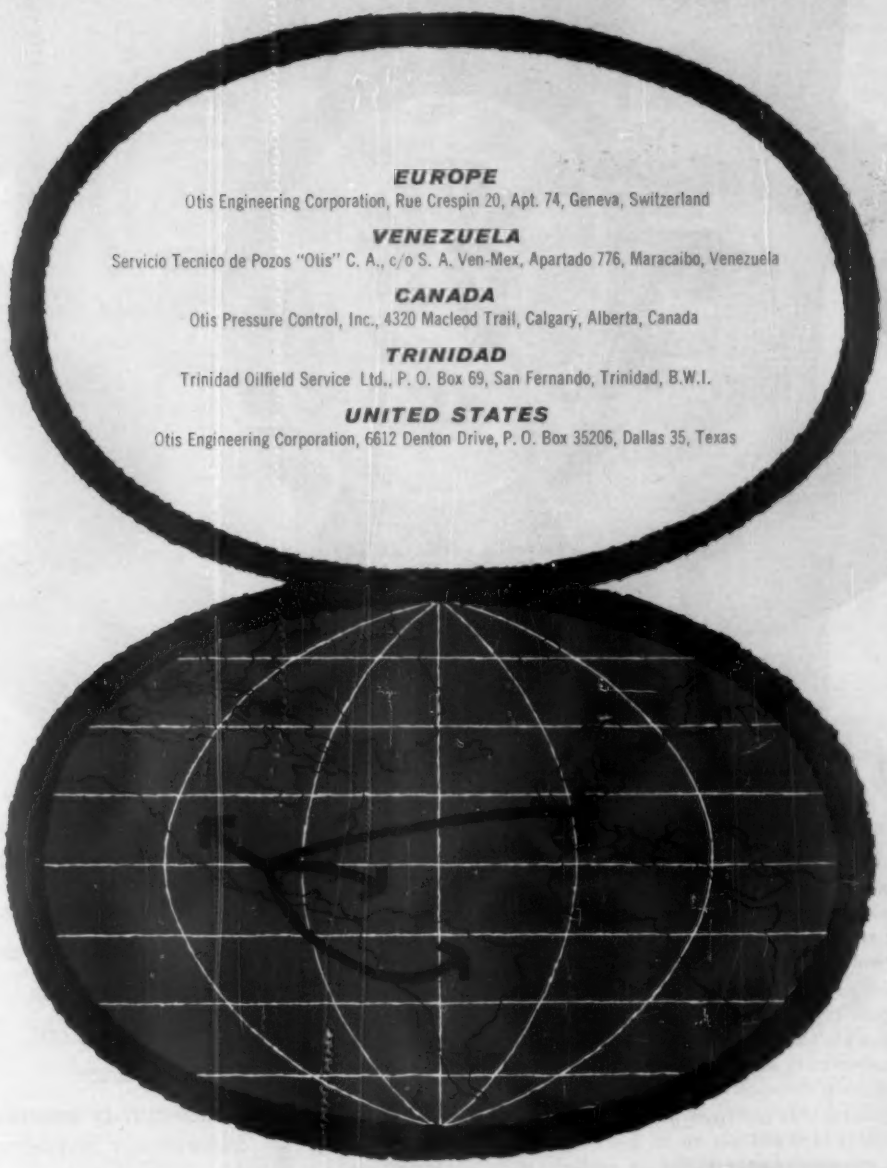

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tion 15, had 125 bbl. oil per day from the Clinton sand at 3,188-3,205 ft. after fracture.

A 1-mile stepout from production in Mt. Perry pool, Madison Township, Perry County, resulted in a 2,190 M.c.f.d. gasser after fracture.

The operators, Smith & Yenne reported the 1 J. E. Thompson, Section 4, found the Clinton sand at 3,198-3,267 ft. Natural gage was 200 M.c.f.d. and rock pressure 900 psi.

Oklahoma's Kingfisher due oil discovery

Kingfisher County, one of Central Oklahoma's busy drilling arenas this year, has a new Mississippian oil discovery west of East Hennessey field.

Slats Honeymon Drilling Co. 1 Brown, SW SE NW 11-19n-7w, flowed 7 bbl. of oil hourly on 14/64-in. choke from perforations at 7,016-26 ft. in lime. The well is an old Union Oil Co. of California wildcat which had gone to 8,225 ft.

Third well at Sooner's West Shattuck flows

The third well in West Shattuck field, Ellis County, northwestern Oklahoma, flowed gas from the Morrow Pennsylvanian sand.

This discovery is Oklahoma Natural Gas Co.'s 1 Gibbs in C SE NW 19-21n-25w, on the east side of the field. Flow was 4,002 M.c.f.d. at 9,960-67 ft. in lower Morrow sand.

West Texas test finds Ellenburger oil

Western Andrews County, West Texas, is in line for an Ellenburger discovery, on the basis of drill-stem tests over a thick oil-bearing section.

Ralph Lowe 1 Magnolia-Morgan is 32 miles west of the town of Andrews and a southwest offset to the one-well Block A-50 field which has pay in the Wichita Albany (Permian).

First test in the Ellenburger to have oil shows was at 11,187-11,216 ft. Recovery in 1 hour was 100 ft. of heavily oil and gas-cut mud. Maximum flowing pressure was 90 psi.

Clean oil was returned on test at 11,189-11,241 ft. Open 1 hour and 15 minutes, it has gas in 13 minutes and recovered 4,500 ft. of free oil. Flowing pressure ranged from 240-590 psi., and shut-in pressure read 4,090 psi. in 15 minutes. An additional 5,060 ft. of oil was recovered from the interval at 11,191-11,291 ft.

Last reported drill-stem test of the Ellenburger was between 11,190-11,305 ft. Recovery was 2,060 ft. of free oil, with maximum flowing pressure of 670 psi.

Location is NE NW of Section 14, Block A-50, PSL Survey. Scheduled depth was 11,500 ft. Operators were coring ahead below 11,304 ft. The discovery prospect is about midway between Nelson field, 5 miles to the northwest, and Block 12 field to the southeast.

New S.D. map

GRAVITY ANOMALIES in an area east of Rapid City, S. D., of interest to petroleum geologists and geophysicists, are shown on a map prepared by Daniel Lum of the South Dakota State Geological Survey. This map will be placed on open file in the Survey office on the fourth floor of the Union Building on the campus of the State University, at 10:00 a. m. on Monday, January 4, 1960, according to the announcement by Allen F. Agnew, state geologist.

The gravity measurements were carried out by the State Geological Survey during the summer of 1959 with the support of a National Science Foundation grant, and the gravity anomaly map was compiled from the data of more than 500 stations in an area of approximately 2,600 sq. miles.

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Ohio wildcat reaches 3,781 ft.

Another rank wildcat, in the search for deep pay in Ohio has reached a depth of 3,731 ft. in Bennington Township, Morrow County.

Monk Oil & Gas Co. 2 J. N. Monk, Section 22, has indicated natural production of 5 bbl. of oil in two horizons, the Glenwood at 3,589 ft. and the Cambro-Ordovician contact at 3,599 ft. The casing is now being perforated in preparation of acidizing these shows.

This test is located about 10 miles west of the Clinton pinchout and has triggered a spirited lease play in the surrounding area.

Michigan well has successful test

IN MICHIGAN, Perry Fulk 1 Zarembra, SE NE 38-4s-3w, Jackson County, showed gas in 14 minutes and 700 ft. oil on drill stem at 4,345-56 ft., for the best gas-oil showing below the Trenton-Black River dolomite ever recorded in the state.

Fulk cemented 5-in. production string at 4,340 ft. after the drill stem.

Geologists tentatively identified the pay section as the St. Peter or Knox dolomite.

The wildcat test is 2 miles southeast of Pulaski pool with a Trenton dry hole less than a mile northwest. It is 2 miles northwest of the Scipio field. Perry drilled tight limestone from Trenton at 3,735 ft. through the 600-ft. section into the top of the St. Peter where a drilling break at 4,345 ft., prompted the drill stem test.

Most of the wildcats drilled in southern Michigan this year in an attempt to pick up new Trenton-Black River dolomite pools have been stopped at total depths short of the St. Peter and Knox sections.

Illinois collects trio of new wells

WESTERN ILLINOIS' shallow Brown County Silurian play picked up three new oil wells, bringing to four the number in the new area 7 miles southwest of Mount Sterling.

E. C. Reeves 1 William L. Davis "A," SW SW SE 8-2s-4w, made 70 bbl. of oil and 20 bbl. water per day on pump at 546-51 ft. The 2 Davis "A" in NE SW SE pumped 250 bbl. per day from 630-31 ft. The third producer is Richard Moore 1 Robinson in NE SE SW. It made 100 bbl. per day and lots of water from 551-52 ft.

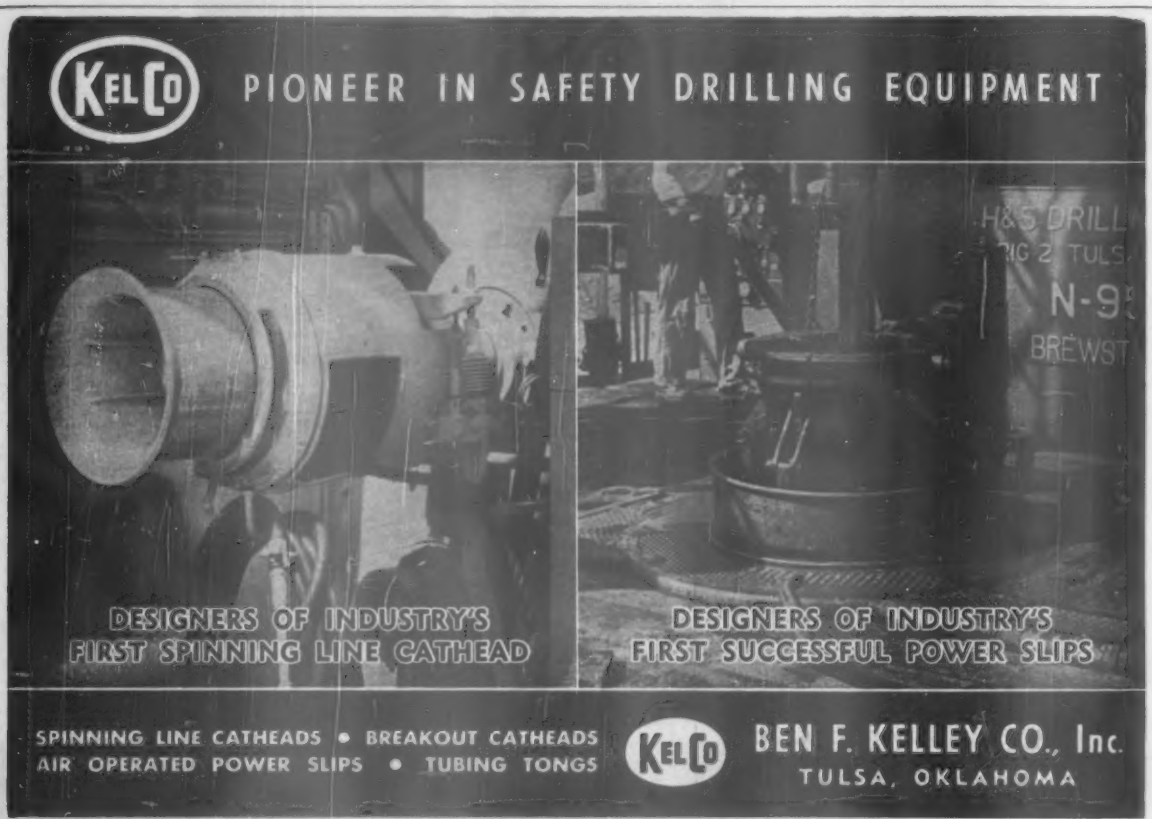
Heavy Ellenburger flow for West Texas well

The second producer and ½-mile-north extension to the Fraden (Ellenburger) pool in southern Upton County, West Texas, has flowed 75 bbl. of oil an hour from the Ellenburger. In addition, the well has had oil or gas shows in several other pays.

Odessa Natural Gas Co. 1 J. H. Shirk Estate is 8 miles northeast of McCamey, and north of Neville G. Penrose 1 King Ranch, discovery well of Fraden field. Location of the Shirk test is SW SW Section 23, Block 2, MK&T Survey.

On drill-stem test of the Ellenburger at 9,895-10,187 ft., No. 1 Shirk flowed oil and gas in 20 minutes. After cleaning into pits it flowed 18 bbl. of 49.5° oil in 18 minutes through ½-in. choke. Following that gage, it tanked 75 bbl. of oil with no water in 1 hour. Flowing pressure was 4,050 psi. Operators were running casing for completion.

Other formations that have indi-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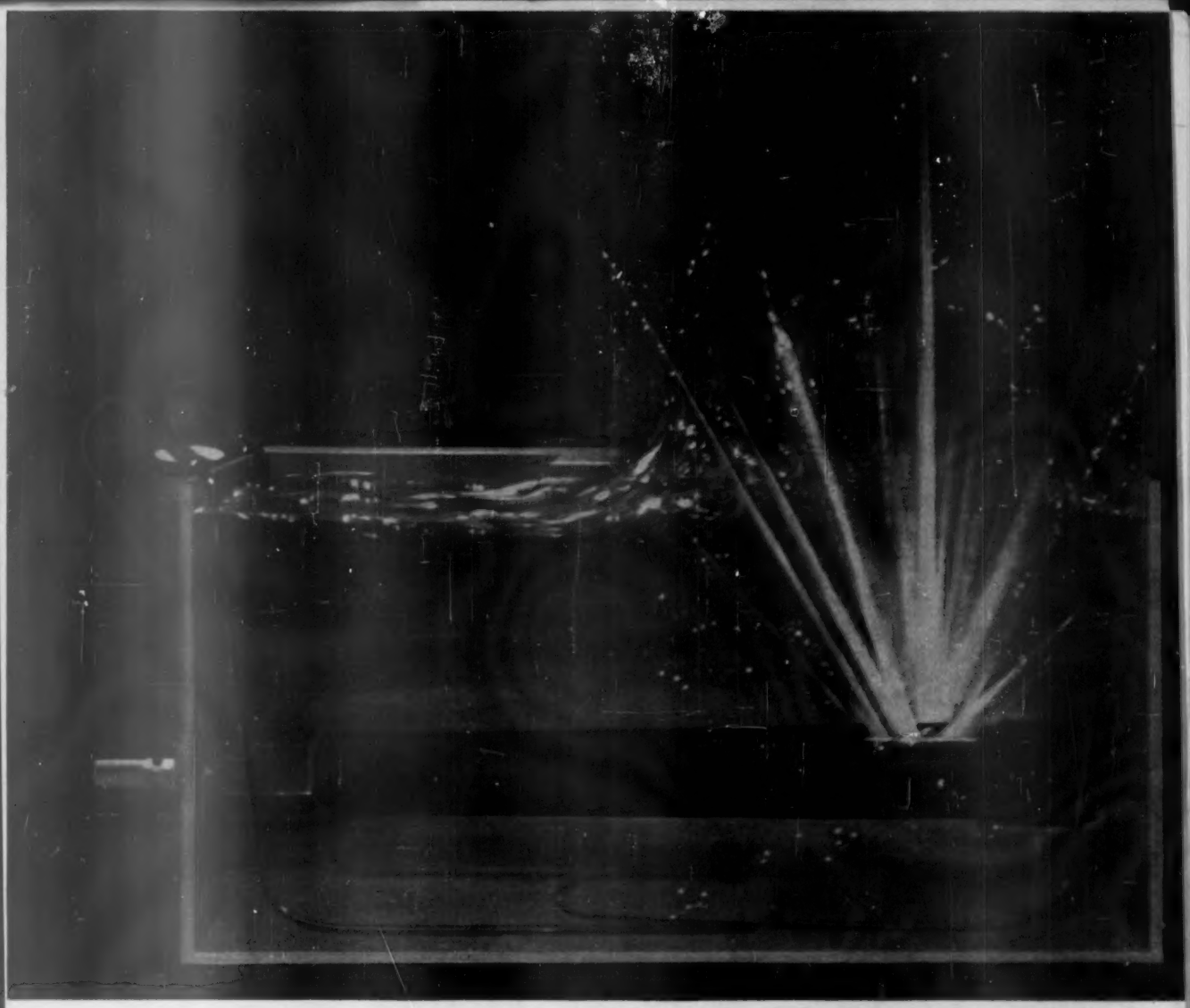

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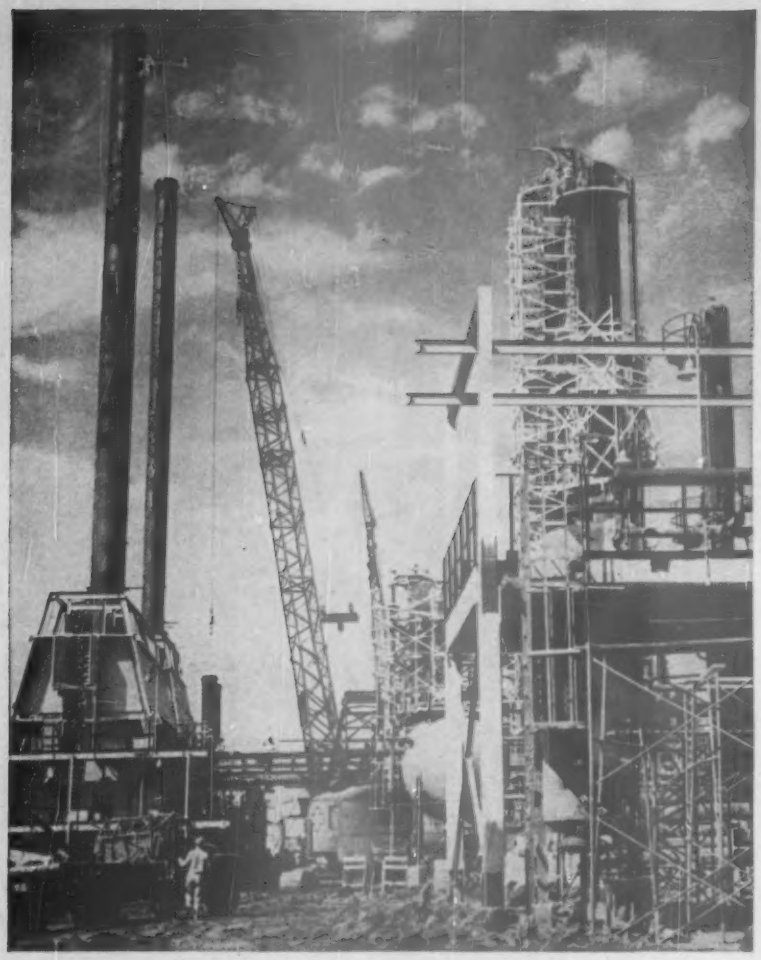

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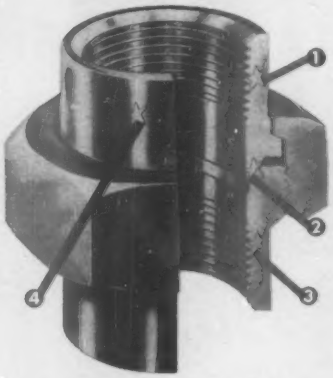

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3. **More than adequate** wall thicknesses give you Catawissa's 3-to-1 Safety Factor (3000-lb. service, 9000-lb. test; 6000-lb. service, 18000-lb. test)!

4. **Round, straight barrels** for fast wrenching. No uneven or tapered surfaces to cause wrench slips or wrench locking!

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cated production in the Shirk well are: The Silurian, which flowed 3,500 M.c.f.d. of gas on drill-stem test at 8,860-8,980 ft.; the Strawn at 7,495-8,041 ft. from which 150 ft. of clean oil was recovered. A test in the Devonian at 8,200-8,760 ft. flowed gas and recovered oil-cut mud, and a test of Canyon lime at 7,415-75 ft. had gas and light-oil shows.

Penrose 1 Kiing Ranch was completed in October for 1,395 bbl. of oil a day through small choke, from pay at 10,145-80 ft.

Texas gas well extends Puckett field 1 mile

Ellenburger gas pay in the Puckett multipay field of Pecos County, West Texas, has been extended on the east side at Standard Oil Co. of Texas 1 Roark.

Completion potential was 22 M.M. c.f. of gas, calculated open flow, from open hole between 14,638-15,005 ft.

Location is approximately SW SW of Section 24, Block 100, EL&RR Survey.

Council Grove pay for Southern Hugoton

FIRST Council Grove Permian gas production in the southern end of Hugoton field is reported at a wildcat inside the field, Texas County, Oklahoma Panhandle.

Phillips Petroleum Co. 2 Reust, C SE NW 20-1n-15eCM, flowed 2 M.M. c.f.d. from 3,342-49 and 3,538-42 ft. Location is 10 miles southeast of Goodwell. Successful completion will open Council Grove production 50 miles south of Panoma gas field in Stevens, Grant, Haskell, and Seward counties in Kansas. Nearest Council Grove gas in Oklahoma is 38 miles west at South Griggs field in Cimarron County. First Council Grove production in Oklahoma was opened over a year ago 56 miles northeast at Mocane.

Kentucky wildcat drilling ahead

In southern Greenup County, Kentucky, on Lost Creek, Oldtown Quadrangle, United Carbon Co. is drilling below 2,800 ft. on its wildcat 1 Felty. Test is designed to test, at least, the Upper and Middle Ordovician section.

Discovery wells

WESTERN CANADA

Alberta: Cities Service et al. 16-2-50-8 Pembina, LSD 16, 2-50-8w5. Cardium oil well. TD 4,744 ft.

Dynamic Western 7-35-22-8 Jenner, LSD 7, 35-22-8w4. Bow Island gas discovery. TD 3,067 ft.

Gulf States et al. 6-33-41-3 Leedale, LSD 6, 33-41-3w5. Detrital gas discovery. TD 8,054 ft.

Nortex-Mobil 10-16-24-16 Control, LSD 10, 16-24-16w4. Detrital gas discovery. TD 3,840 ft.

Nortex-CPR 10-9-24-15 Hutton, LSD 10, 9-24-15w4. Viking gas discovery. TD 3,757 ft.

McGaha 7-9-27-4w4 Oyen, LSD 7, 9-27-4w4. Viking gas discovery. TD 3,210 ft.

LOUISIANA OFFSHORE

South Marsh Island area: Texaco Inc., 6 State Lease 340-Mound Point OCS-O310, Gulf of Mexico. 1,932 M.c.f.d., 7 BOPD, 8/64-in., 45.6°, TP 3,525 psi., perf. 9,213-17 ft. TD 12,750 ft. New pay in Mound Point field.

Vermilion area: Union Oil Co. of California 1 OCS-0579, Blk 35, Gulf of Mexico. IP 560 BOPD, 12/64-in., 34.6°, GOR 405 cu. ft. per barrel, TP 1,425 psi., perf. 10,396-10,414 ft., and 253 BOPD, 5,100 M.c.f.d., 13/64-in., 53.8°, TP 3,540 psi., perf. 10,604-30 ft. TD 12,076 ft. New offshore field.

NORTH LOUISIANA

LaSalle Parish: Nebo Oil Co., Inc., 110 Nebo Fee, C NE SW 22-8n-2e, 2¼ miles northwest of Trout Creek field. IPP 12 BOPD, perf. 2,173-74 ft., Wilcox. TD 3,250 ft. New field.

SOUTH LOUISIANA

Acadia Parish: Michael T. Halbouty 1 Arnold Ledoux Estate, 37-7s-1w, 2 miles northeast of Richie field. IP 72 BOPD, 1,800 M.c.f.d., 9/64-in., 55°, TP 2,450 psi., perf. 9,171-76 ft. TD 9,881 ft. New field.

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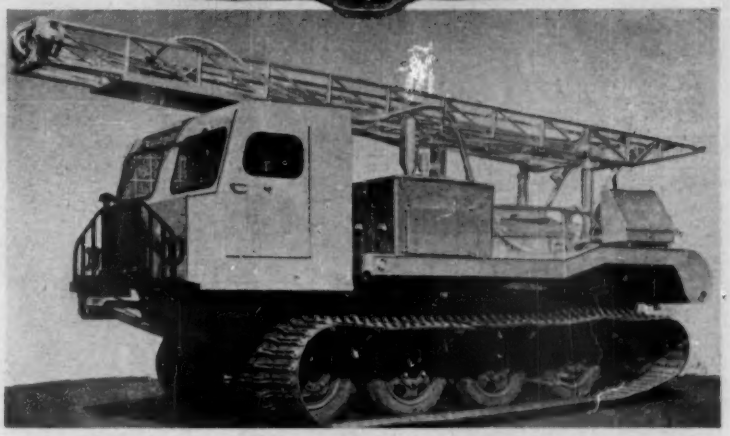

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Pearl River County: Discovery Oil & Gas Co. 1 Crosby, NW NW NE 27-2s-17w. IP 2,191 M.c.f.d., 26 BCPD, 16/64-in., TP 2,200 psi., perf. 9,007-08 ft., Lower Tuscaloosa. TD 10,520 ft. Elev. 198 ft., Lower Tuscaloosa 8,895 ft., Lower Cretaceous 9,491 ft. New field.

NORTHWEST NEW MEXICO

San Juan County: Benson-Montin-Greer Drilling Co. 1 Jones, SE SE 17-28n-13w. IPF 1,818 M.c.f.d., ¾-in. choke. TD 6,358 ft. Dakota discovery, new field.

International Oil Co. 1 E. E. Fogelson, SE SE 27-30n-11w. IPF 4,467 M.c.f.d., ¾-in. choke, Dakota discovery, new field. TD 7,080 ft.

Alex N. Campbell 1 Western, SW NE 25-27n-12w. IPF 3,440 M.c.f.d., ¾-in. choke, 6,155-87 ft., Dakota discovery, new field. TD 6,242 ft.

SOUTHEAST NEW MEXICO

Eddy County: Standard Oil Co. of Texas 10-1 Lillian Coll, 10-16s-31e, 10 miles northwest of Maljamar. IPP 122 BOPD, 34°, GOR 1,945:1, Permian 3,633-85 ft. TD 13,400 ft., PB 3,693 ft.

Sun Oil Co. 1 English-Federal, 20-19s-31e, 13 miles southwest of Maljamar. IPP 53 BOPD, 32°, pay 2,123-85 ft. TD 3,581 ft.

TEXAS GULF COAST

DeWitt County: DeLange, Neathery & Schimmel 1 Gohlke, W. S. Hughes Sur., A-237, 6 miles west of Weesrche. IP 162 BOPD, 10/64-in., 33.8°, GOR 971 cu. ft. per barrel, TP 700 psi., perf. 7,634-38 ft., Wilcox-Luling sand. TD 8,002 ft. New field.

Lone Star Producing Co. 1 Berthold Koenig, Charles Amsler Sur., A-57, 8 miles southeast of Cuero, AOF 33,500 M.c.f.d., 60 BC per M.M.c.f., 50.3°, shut-in TP 6,485 psi., perf. 10,694-10,711 ft., Wilcox. TD 12,750 ft.

Hardin County: Oil Reserves Corp. 1-K Kirby-Spear, Thomas Spear Sur., A-48, 5 miles northwest of Beaumont. AOF 31 M.M.c.f.d., GLR 90.1 M.c.f. per barrel, 58° shut-in TP 2,700 psi., perf. 7,335-41 ft., Frio. TD 7,704 ft. New field.

Harris County: Woods Exploration & Producing Co. 1 H. E. Doerre, GC&SF Sur., A-1301, 4 miles southeast of Tomball. AOF 16 M.M.c.f.d., GLR 110 M.c.f. per barrel, 57°, shut-in TP 1,320 psi., perf. 5,796-5,808 ft., Cockfield. TD 5,855 ft. Extension and new pay in Hinkle field.

Jackson County: Carrl Oil Co. and others 1 Mrs. Lucile Westhoff, Sec. 6, Westhoff Ranch Subd., Thomas Menefee Sur., A-52, 3 miles southeast of Edna. AOF 8,800 M.c.f.d., dry gas, shut-in TP 2,327 psi., perf. 6,102-12 ft., and 17 M.M.c.f.d., dry gas, 2,149 psi., perf. 5,372-82 ft. New field.

Matagorda County: J. M. Huber Corp. and Lion Oil Co. 1 Blanche Wolf O'Connor, Henry Harrison Sur. 2, A-47, 2½ miles southeast of Markham. IP 83.53 BOPD, 12/64-in., 27.3° TP 860 psi., GOR 5,338 cu. ft. per barrel, perf. 10,482-86 ft., Frio. TD 10,793 ft. New pay in West Lucky field.

Texaco Inc., 3 Evelyn Harriman, Blk. 35, Moore Pasture Subd., James McFarland Sur., 4 miles north of Colegeport. IP 201 BOPD, 12.64-in., 36°, TP 800 psi., GOR 821 cu. ft. per barrel, perf. 9,068-78 ft., Frio, and (dual completion) 165 BOPD, 12/64-in., 35.7°, 550 psi., GOR 859 cu. ft. per barrel, perf. 9,046-52 ft., Frio. TD 9,150 ft. New pays in Palacious field.

Kilroy Co. of Texas, Inc., F. A. Callery, Inc., and Pan American Petroleum Corp. 1 Hogg-State Oil Unit 1, Williams Parks Sur., A-67, 5 miles northeast of Palacious. IP 187 BOPD, 11/64-in., 38.4°, TP 975 psi., GOR 1,353 cu. ft. per barrel, perf. 8,133-42 ft., Frio, and (dual completion) AOF 13,500 M.c.f.d., GLR 66.6 M.c.f. per barrel, 54.3°, shut-in TP 3,349 psi., perf. 8,768-84 ft., Frio. TD 10,500 ft. New pays in Palacious field.

Magnolia Petroleum Co. 1 John Matl, Sec. 31, Texas Rice Development Co. Subd., Susan Perkins Sur., A-371, 5 miles northwest of Palacious. AOF 13,300 M.c.f.d., GLR 22.6 M.c.f. per barrel, shut-in TP 6,478 psi., perf. 10,772-82 ft., Frio, (dual completion) 16,800 M.c.f.d., GLR 18.7 M.c.f. per barrel, 47.8°, 6,246 psi., perf. 10,559-62 Ft., 10,673-77 ft., 10,582-88 ft., and 10,593-95 ft., Frio. TD 11,650 ft. New pays in Southwest Pheasant field.

Newton County: Oil Reserves Corp. 3 Kirby-Winfrey, Sarah Winfrey Sur., A-508, 3 miles northeast of Bon Wier. IP 181.76 BOPD, 14/64-in., 46.3°, GOR 3,365 cu. ft. per bbl., TP 1,000 psi., perf. 10,258-264 ft., Wilcox. TD 10,956 ft. New pay in Quicksand Creek field.

Oil Reserves Corp. 2 B. G. Lindsey, Adam L. Stewart Sur., A-376, 3 miles northeast of Bon Weir. IP 197.39 BOPD, 12/64-in., 40.1°, GOR 679 cu. ft. per bbl., TP 550 psi., perf. 10,094-10,112 ft., Wilcox. TD 10,963 ft. New pay in Quicksand Creek field.

Nueces County: S. H. Howell 1 Brauner, Sec. 164, O. M. Oliver Sur., A-693, 2

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★ Mast portability, economy & maximum utility
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The November completion count in the U. S.

	TOTAL COMPLETIONS							WILDCAT WELLS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	4	3	0	0	1	0	35,978	1	0	0	0	1	1,275	0	8
Alaska	1	0	0	0	1	0	8,865	1	0	0	0	1	8,865	0	3
Arizona	2	0	0	0	2	0	8,113	2	0	0	0	2	8,113	0	3
Arkansas	59	29	0	4	26	0	203,120	11	1	0	2	8	43,473	0	97
California	113	53	0	11	41	8	479,233	29	2	0	3	24	181,444	1	118
Colorado	64	16	0	7	41	0	289,538	35	7	0	1	27	179,511	0	114
Florida	2	0	0	0	2	0	13,064	2	0	0	0	2	13,064	0	1
Illinois	235	99	0	0	115	21	523,121	45	6	0	0	39	93,498	16	428
Indiana	93	31	0	1	60	1	129,158	28	4	0	0	24	38,012	78	105
Kansas	309	132	0	15	157	5	1,154,315	94	11	0	3	80	369,842	2	446
Kentucky	584	468	0	2	113	1	423,886	74	5	0	0	69	79,834	500	203
Louisiana	319	171	26	14	107	1	2,304,493	40	4	0	1	35	347,473	0	424
North	146	86	0	11	49	0	500,598	19	3	0	1	15	93,942	0	149
South	140	67	19	2	51	1	1,471,439	21	1	0	0	20	253,531	0	220
Offshore	33	18	7	1	7	0	332,456	0	0	0	0	0	0	0	55
Michigan	56	21	0	5	30	0	177,900	18	0	0	0	18	61,529	21	165
Mississippi	46	17	3	0	26	0	467,812	22	4	0	0	18	235,743	0	77
Montana	40	13	0	5	22	0	203,274	20	2	0	1	17	100,800	5	67
Nebraska	67	16	0	0	51	0	394,849	32	2	0	0	30	193,681	0	64
New Mexico	177	100	4	32	41	0	758,589	23	1	0	0	22	73,127	35	266
West	63	17	3	30	13	0	268,358	7	1	0	0	6	26,040	8	160
East	114	83	1	2	28	0	490,231	16	0	0	0	16	47,087	27	106
New York	24	12	0	0	5	7	38,755	3	0	0	0	3	11,383	24	21
North Dakota	30	16	2	0	12	0	198,079	7	0	0	0	7	29,844	0	32
Ohio	114	61	0	21	26	6	290,199	6	1	0	2	3	22,691	105	199
Oklahoma	420	220	9	24	163	4	1,781,761	71	7	4	7	53	402,338	62	729
Pennsylvania	58	15	0	28	5	10	175,759	2	0	0	0	2	10,716	50	61
South Dakota	4	2	0	0	2	0	34,641	1	0	0	0	1	9,005	0	11
Tennessee	7	0	0	0	7	0	6,556	6	0	0	0	6	5,866	7	30
Texas	1,359	743	58	57	471	30	5,803,315	263	8	2	6	247	1,233,782	72	1,183
Dist. 1	90	46	3	1	40	0	263,388	25	1	0	0	24	96,595	0	39
Dist. 2	72	26	12	8	25	1	440,582	16	0	0	1	15	90,768	0	55
Dist. 3	86	34	11	1	40	0	583,543	17	0	0	0	17	133,921	0	104
Dist. 4	104	26	10	15	52	1	524,665	35	2	0	3	30	177,099	7	75
East	89	51	3	2	33	0	442,148	22	0	0	0	22	136,190	0	69
Dist. 7-B	229	116	3	7	93	10	644,089	49	3	2	2	42	163,822	0	106
West	378	271	5	9	85	8	1,895,674	47	0	0	0	47	225,832	23	469
Dist. 9	226	123	2	3	89	9	584,076	43	2	0	0	41	147,162	42	121
Dist. 10	85	50	9	11	14	1	425,150	9	0	0	0	9	62,393	0	145
Utah	28	9	0	3	16	0	174,026	17	1	0	2	14	115,656	0	43
West Virginia	59	5	0	40	10	4	146,757	0	0	0	0	0	0	59	189
Wyoming	79	23	0	8	47	1	418,911	37	1	0	0	36	213,008	4	175
Total Nov. 1959	**4,353**	**2,275**	**102**	**277**	**1,600**	**99**	**16,644,067**	**890**	**67**	**6**	**28**	**789**	**4,083,573**	**1,041**	**5,262**
Total Oct. 1959	4,115	1,973	103	353	1,530	156	16,614,184	811	56	2	44	709	3,782,994	872	5,081
Cum. 1959	46,288	23,072	1,132	3,419	17,386	1,279	190,724,554	9,092	797	99	309	7,887	43,909,904	8,558	....
Cum. 1958	44,568	21,909	1,015	3,384	17,060	1,200	180,456,874	8,791	845	141	244	7,561	40,721,681	....	....

Note: C.T.=Cable Tool Comp., D.D.=O.W.D.D., Act. Op.=Active Operations.
D.D.=29: Ill. 9, Ky. 2, Kans. 2, Okla. 7, Colo. 2, Ohio 2, Neb. 1, Texas (2) 1, Texas (4) 2, N. La. 1.

. . . and in Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1959	Total	Oil	Gas	Dry	Footage	Cum. 1959
Western Canada	**205**	**106**	**30**	**60**	**9**	**1,054,432**	**2,242**	**58**	**8**	**10**	**40**	**301,004**	**618**
Alberta	139	71	23	36	9	776,117	1,424	42	6	10	26	229,450	368
Saskatchewan	54	33	1	20	0	219,677	690	13	2	0	11	55,337	186
Manitoba	3	1	0	2	0	7,413	36	2	0	0	2	5,250	9
British Columbia	9	1	6	2	0	51,225	88	1	0	0	1	10,967	51
Northwest Territories	0	0	0	0	0	0	4	0	0	0	0	0	4
Ontario	13	1	6	5	1	17,076	255	..	..	..	..	.....	...

miles south of Violet. AOF 4 M.M. c.f.d., dry gas, shut-in TP 950 psi., perf. 2,584-2,602 ft., Oakville. TD 2,750 ft. New field.

TEXAS PANHANDLE

Ochiltree County: Horizon Oil & Gas Co. 1-14 Clement, Sec. 14, Blk. R., B&B Sur., 7 miles southeast of Spearman. IPCAOF: 8,250 M.c.f.d., Morrow 7,758-67 ft.; IPCAOF: Mississippian 1,700 M.c.f.d., 8,470-90 ft. TD 8,492 ft.

Texaco Inc. 1 W. C. Herndon "B", Sec. 663, Blk. 43, H&TC Sur. IPF 25 BOPD, 1-in. choke, 40°, Atoka 7,908-18 ft. TD 8,900 ft. Dual oil and gas discovery. IPF 3 M.M.c.f.d., 1-9n. choke Morrow 8,721-48 ft.

A. R. Dillard Inc. 1-B Allen Estate, Sec. 17, Blk. 12, H&GN Sur., 3¾ miles south of Perryton. IPF 252 BOPD, ½-in. choke, 40.8°, GOR 1890:1. Cleveland 6,688-6,732 ft. TD 8,225 ft.

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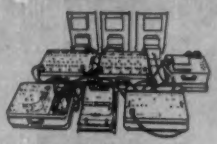

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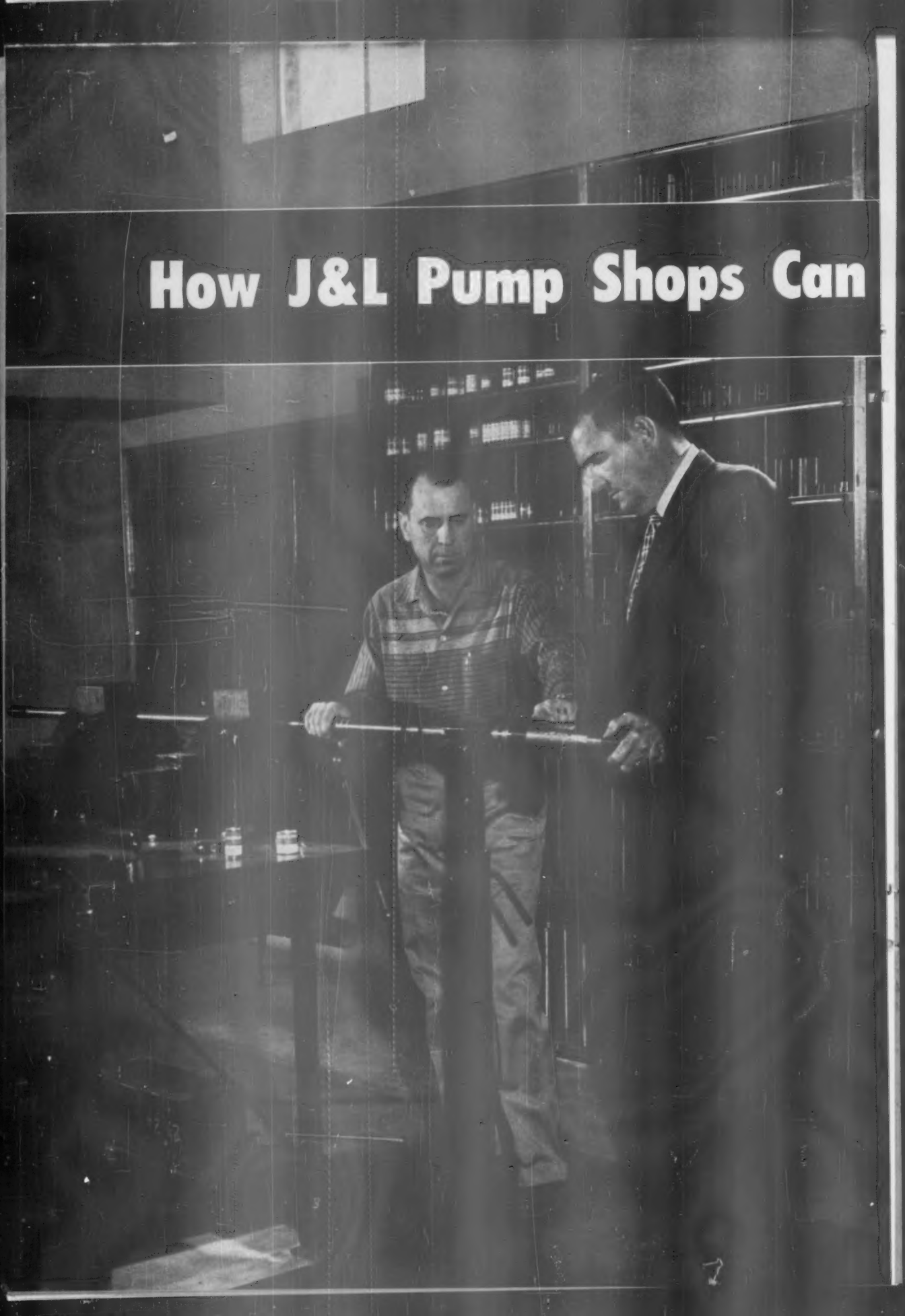

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SUPPLY DIVISION – Tulsa

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November footage breakdown

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	34,703	.....	.....	.....	.....	.....	.....	.....	1,275
Alaska	.....	.....	.....	.....	.....	.....	.....	.....	8,865
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	8,113
Arkansas	82,152	.....	10,496	66,999	.....	9,444	.....	11,970	22,059
California	167,003	.....	29,941	61,799	39,046	16,186	.....	10,764	154,494
Colorado	33,510	.....	22,962	53,555	.....	27,414	.....	8,952	133,145
Florida	.....	.....	.....	.....	.....	.....	.....	.....	13,064
Illinois	215,551	.....	182,358	31,714	.....	15,848	.....	.....	77,650
Indiana	36,645	.....	888	50,960	2,653	4,708	.....	.....	33,304
Kansas	425,865	.....	56,085	286,816	15,707	47,759	.....	16,429	305,654
Kentucky	305,058	.....	3,542	35,052	400	3,065	.....	.....	76,769
Louisiana	1,044,654	309,922	79,365	520,775	2,304	35,267	.....	3,006	309,200
North	218,934	.....	47,053	140,669	.....	20,041	.....	3,006	70,895
South	648,650	233,398	22,298	311,258	2,304	15,226	.....	.....	238,305
Offshore	177,070	76,524	10,014	68,848	.....	.....	.....	.....	.....
Michigan	71,777	.....	6,789	37,805	.....	.....	.....	.....	61,529
Mississippi	141,485	30,744	.....	59,840	.....	47,577	.....	.....	188,166
Montana	74,086	.....	10,443	17,945	.....	12,444	.....	2,817	85,539
Nebraska	81,031	.....	.....	120,137	.....	12,179	.....	.....	181,502
New Mexico	429,354	29,782	143,786	82,540	.....	7,268	.....	.....	65,859
West	67,871	19,592	137,524	17,331	.....	7,268	.....	.....	18,772
East	361,483	10,190	6,262	65,209	.....	.....	.....	.....	47,087
New York	15,252	.....	.....	2,800	9,320	.....	.....	.....	11,383
North Dakota	111,415	23,384	.....	33,436	.....	.....	.....	.....	29,844
Ohio	138,409	.....	50,564	60,496	18,039	1,554	.....	10,585	10,532
Oklahoma	816,154	41,847	105,137	412,190	4,095	40,413	30,395	55,673	275,857
Pennsylvania	28,741	.....	108,006	8,896	19,400	.....	.....	.....	10,716
South Dakota	17,044	.....	.....	8,592	.....	.....	.....	.....	9,005
Tennessee	.....	.....	.....	690	.....	.....	.....	.....	5,866
Texas	2,916,899	439,737	268,741	880,528	63,628	34,666	9,167	22,783	1,167,166
Dist. 1	86,220	27,156	3,700	49,717	.....	6,010	.....	.....	90,585
Dist. 2	143,556	97,566	41,467	61,453	5,772	.....	.....	4,015	86,753
Dist. 3	198,225	101,148	7,350	142,899	.....	.....	.....	.....	133,921
Dist. 4	113,222	67,686	68,408	98,090	160	10,603	.....	11,943	154,553
East	200,899	21,696	13,487	69,876	.....	.....	.....	.....	136,190
Dist. 7-B	301,802	3,744	15,415	141,557	17,749	7,558	9,167	6,825	140,272
West	1,366,148	36,361	58,958	190,351	18,024	.....	.....	.....	225,832
Dist. 9	296,394	11,538	19,744	95,365	13,873	10,495	.....	.....	136,667
Dist. 10	210,433	72,842	40,212	31,220	8,050	.....	.....	.....	62,393
Utah	44,970	.....	5,605	7,795	.....	13,354	.....	15,753	86,549
West Virginia	8,955	.....	87,206	33,177	17,419	.....	.....	.....	.....
Wyoming	114,287	.....	45,222	42,218	4,176	6,745	.....	.....	206,263
Total U. S.	**7,355,000**	**875,416**	**1,034,778**	**3,067,399**	**227,901**	**345,891**	**39,562**	**158,732**	**3,539,388**
Western Canada	526,057	.....	89,399	91,097	46,875	49,863	.....	57,337	193,804
Alberta	393,261	.....	55,741	50,790	46,875	41,061	.....	57,337	131,052
Saskatchewan	125,773	.....	2,370	36,197	.....	8,802	.....	.....	46,535
Manitoba	2,163	.....	.....	.....	.....	.....	.....	.....	5,250
British Columbia	4,860	.....	31,288	4,110	.....	.....	.....	.....	10,967

NORTH TEXAS

Archer County: Gulf Oil Corp. 1 R. G. Jones, TE&L Sur., A-578, 7 miles south of Windthorst. IPP 242 BOPD, 44°, GOR 185:1, Mississippian 5,344-84 ft. TD 5,836 ft.

WEST TEXAS

Borden County: Rowan Drilling Co. et al. 1 Price, Sec. 39, Blk. 30, J. H. Gibson Sur., 6 miles northeast of Gail. Dual completion. Strawn IP 551 BOPD, 20/64-in. choke, 41°, GOR 609:1, TP 250 psi., pay 8,238-42 ft.; Ellenburger IP 834 BOPD, 18/64-in. choke, 41°, GOR 500:1, TP 650 psi., pay 8,527-36 ft. TD 8,536 ft., elevation 2,505 ft.

Crockett County: Sinclair Oil & Gas Co. 1 University-Crockett "154," Sec. 8, Blk. 46, University Lands Sur., 16 miles northwest of Ozona. IPP 16 BOPD, 28°, Grayburg 1,880-2,197 ft. TD 9,930 ft.

Crosby County: Sinclair Oil & Gas Co. 1 Valvera Hampton, Sec. 10, Blk. D-19, D&SE Sur., 8 miles east of Slaton. IPP 24 BOPD, 23°, Clear Fork 4,094-4,101 ft. TD 9,320 ft.

Glasscock County: Hamilton Bros. Ltd. 1-22 Reynolds, Sec. 22, Blk. 32, T4S, T&P Sur., 10 miles east of Garden City. IPP 130 BOPD, 30°, Queen 1,883-91 ft. TD 3,000 ft.

WEST CENTRAL TEXAS

Haskell County: Bander & Couch 1 C. M. Walsworth, Sec. 246, Blk. 45, H&TC Sur., ½ mile east of O'Brien. IPP 110 BOPD, 40°, GOR 176:1, Strawn sand 4,906-14 ft. TD 5,000 ft.

Jones County: Fletcher Oil & Gas Drilling Corp. 1 Snyder, Subd. 9, DeWitt CSL Sur. 150, 2½ miles southeast of Noodle. IP 88 BOPD, 16/64-in. choke, 40°, GOR 670:1, TP 140 psi., Swastika 2,990-98 ft. TD 4,755 ft.

Stephens County: R-G Drilling Co., Inc., 1-A Robbins, Sec. 14, Blk. 8, T&P Sur., 5 miles west of Breckenridge. IPP 50.7 BOPD, 43°, GOR 400:1, Ellenburger 4,427-61 ft. TD 4,505 ft.

Stonewall County: B. A. Duffy 1 Scott, Sec. 151, BBB&C Sur., 7 miles northeast of Hamlin, new pay in Carol Ann (L. Tannehill field). IPP 71 BOPD, 36°, GOR 340:1, pay 2,636-41 ft. TD 3,476 ft.

Jake L. Hamon 2 Hart, Sec. 150, Blk. D, H&TC Sur., 7 miles north of Aspermont, new pay. IP 110 BOPD, 20/64-in. choke, TP 40 psi., 39°, GOR 200:1, Lower Tannehill 3,136-42 ft. TD 3,142 ft.

Taylor County: Bridwell Oil Co. 1 Grady Petree, Subd. 20, Guadalupe CSL Sur. 120, 2 miles northwest of View. IPP 37 BOPD, 38°, GOR 250:1, pay 4,453-63 ft. TD 4,473 ft.

Fletcher Oil & Gas Drilling Corp. 1 McMillon, J. C. Eels Sur. 453, 2 miles northeast of Bradshaw. IP 119 BOPD, 24/64-in. choke, 40°, TP 115 psi., pay 4,415-21 ft. TD 4,558 ft.

Wilson Is Youngest Shell V.P.

• He takes over this week from E. D. Cumming as head of exploration and production in Shell's Houston area.

BACK in the middle-30's, when James E. Wilson was a scrub quarterback and end at Texas A.&M., his professor remarked one night beside a campfire on a geology field trip:

"You've got to make up your mind whether you're going to be a football player or a geologist. You're not doing very well at either one."

Wilson recalled the incident last week in a moment of whimsy and confirmed the professor was right. He did give up football his senior year, added another year of graduate study and took a job with Shell.

On January 1, at the age of 44, Jim Wilson will become the youngest vice president in the vast Shell Oil Co. organization. He will direct exploration and production for the Houston area, succeeding E. D. Cumming, who retires.

A restless but personable fellow who knows how to get the most out of his staff, Wilson intends to find a lot more oil in the deeper sands of East, South, and Gulf Coast Texas.

"Our people have a good head of steam up," he said. "And I don't intend to throttle back. There isn't anything we can't accomplish—with a little luck."

As the man in charge of an exploration and production staff of 1,300, Wilson believes his crews can use new seismic techniques to reshoot old areas and uncover important deep oil prospects passed up over the last half-century.

Shell's exploration budget for the Houston area actually is higher for 1960 than for 1959. The production budget is about the same.

Swift rise . . . Shell recognized long ago the administrative potential of Jim Wilson.

As every Shell man knows, when he's called for a tour of duty at The Hague, it means the company has its eye on him. That's what happened to Wilson in 1952, when he was assigned to The Hague and given the side-trip treatment that included visits to North Africa and the Middle East.

"I learned then the advantages of not putting all your eggs in one basket," he said. "If disaster hits you in one place, it doesn't put you out of business."

Prior to his trip abroad, Wilson's history had been much like that of many other Shell geologists.

Texas-born and Texas-reared (McKinney), he finished his college work at Texas A.&M. in 1938 and reported to San Antonio with Shell, the only boss he's ever had.

James E. Wilson
. . . no armchair executive

He moved through the Texas oil patch like a nomad: His wife, the former Elloie Barkley claims they moved 11 times in their first 20 months of marriage. By the time he entered the Army for World War II, he had piled up a wealth of experience as a surface geologist.

The war . . . Jim Wilson will never be much of an armchair executive—for more reasons than one.

When he sits for long spells, the shrapnel still embedded in his thigh begins acting up, and he has to get up and walk around. Also his left hand is still a bit stiff because a nerve was injured by the same exploding shrapnel in Normandy not long after D-Day.

A captain in reconnaissance with the Third Army Division, he was near St. Lo when the shell blast put him out of commission as a fighting man. When he finally recovered, he finished the war as a major and an instructor at Fort Leavenworth.

Post-war . . . Mustered out in 1945, Wilson again began his travels with Shell—in Tyler, Tex., Wichita Falls, Oklahoma City, New York, The Hague, Tulsa, Casper, Denver, and finally Houston.

He rose from staff geologist, to division geologist, to division exploration manager, to area geologist, to area exploration manager, and then, in July of 1958, to director of exploration research for Shell Development Co. in Houston.

Last July he was plucked out of research to become acting exploration manager briefly for the Houston area and then, in September, he moved in as Cumming's executive assistant to prepare for the vice presidency.

As a young man on the rise, Wilson is a man to watch in the Shell organization. He is one of five area vice presidents for exploration and production. He reports directly to D. B. Kemball-Cook, executive vice president for exploration and production in New York.

Wilson is confident in his new job, and he's proud to have always been a Shell man.

"I like these people and the principles our company stands for," he said. "If I didn't, I'd have left a long time ago."

The Wilsons have two daughters, Judy, 15, and Elizabeth, 11. He is a member of several petroleum organizations and is on the board of stewards at St. Paul's Methodist Church.

●

W. L. Effinger, formerly chief geologist for California Exploration Co., has been appointed assistant chief geologist in the exploration department of Standard Oil Co. of California, Western Operations, Inc.

Dr. W. G. Toland, senior research associate for California Research Corp., has been appointed research scientist in the Richmond, Calif., laboratory. **W. A. Scheller** has been appointed group supervisor in the process and plant design division, Richmond.

Larry Turner, Gulf Oil Corp., has been elected president of the Tri-State Association of Petroleum Engineers. Other officers will be **L. R. (Dick) Peddycoart,** Nelson W. Williams & Co., first vice president; **Richard Hazen,** Barron Kidd, second vice president; **Ed Cole,** Superior Oil Co., third vice president; **Bob Grimm,** Nelson W. Williams, secretary-treasurer; and **Ralph Hague,** Hague Equipment Co., Inc., publicity chairman.

▶▶▶ Personals

Howard G. Vesper, president of Standard Oil Co. of California, Western Operations, Inc., has been elected president of Western Oil and Gas Association. He succeeds **Olen Lane,** Continental Oil Co. Other new officers are **Howard C. Pyle,** Monterey Oil Co., first vice president; **George F. Getty II,** Tidewater Oil Co., second vice president; and **T. H. Wallace,** Western Gulf Oil Co., treasurer. **Felix Chappellet** was reelected secretary, vice president, and general manager of the association. New directors are Getty, **Ralph Edgington,** Edgington Oil Refineries, Inc.; and **Harold C. Morton,** Morton & Dolley.

VESPER

Roy Linden, vice president in charge of marketing for Union Oil Co., will retire January 31. Linden joined Union in 1916. He was named vice president and sales manager in 1949 and vice president in charge of marketing in 1956.

K. P. Wood, Michigan independent operator, has been elected president of the newly organized Michigan Landmen's Association. Other officers are **Glen Mapes,** Carter Oil Co., vice president; **C. R. Dillman,** independent, secretary; and **John Delacca,** Ohio Oil Co., treasurer.

John Ferry, of U. S. National Bank, Denver, is newly elected chairman of the Denver section of AIME's Society of Petroleum Engineers. Other officers are **L. B. Curtis,** Continental Oil Co., first vice chairman; **James Taylor,** TWH Drilling Co., second vice chairman; **James Roe,** Lufkin Foundry & Machine Co., secretary-treasurer; and **Willard Bauman,** Gulf Oil Corp., a director.

Charles E. Stout has been named vice president and chief geologist for the Columbia Gas System Service Corp. He succeeds **Ernest E. Roth,** who has retired after 32 years with the system. Stout joined Columbia in 1930 but left the company in 1945 to join Pennsylvania Grade Crude Oil Association and later, National Gas & Oil Corp. He rejoined Columbia in 1949 as manager of geology and gas depletion for United Fuel Gas Co., an affiliate. He had been assistant to Roth since 1951.

Doyle G. Marrs, formerly in Dallas with Magnolia Petroleum Co., has been transferred to Midland, Tex., and promoted to division reservoir engineer for Mobil Oil Co.

Joseph P. Moran, reservoir engineer in the chemical research laboratory of Dow Chemical Co.'s Dowell division, has been named manager of Dowell's technical services and development department in Tulsa. He succeeds **J. A. Harmon,** who recently was named Dowell district manager in Amarillo, Tex.

Dr. Rush F. McLeary, general manager of the research and development department of Jefferson Chemical Co., has been elected vice president for research and development, a new position. McLeary was with Texaco Inc. before joining Jefferson Chemical.

Herbert E. Paul, assistant general sales manager for the Pacific Coast region of Texaco Inc., has been promoted to general sales manager, Pacific Coast. He will headquarter in Los Angeles. Paul succeeds **I. G. Morgan,** who was recently named vice president of the domestic sales department. **D. Allan Sedgwick,** assistant general sales manager of the company's northern region in New York, will succeed Paul.

Dr. Philip C. White, general manager of research and development for Standard Oil Co. (Ind.), will be general manager of a new research and development department formed by consolidation of petroleum products and processes research of Indiana Standard, American Oil Co. and Utah Oil Refining Co., subsidiaries. In the Chicago office of the new department, **P. H. Sullivan** will continue as manager of patents and licensing; **Dr. James E. Seebold** will be coordinator of process and engineering development; **John B. Duckworth,** coordinator of products; and **Dr. Nathan Fragen,** coordinator of contract research and commercial development. At the Whiting, Ind., lab, **Dr. Arthur P. Lien,** Indiana Standard director of petroleum research, will be manager of research and development. **Dr. A. A. O'Kelly,** manager of research for American Oil in Texas City, will be director of petroleum research and development. **Dr. C. M. Loane** has been named director, product research; **A. L. Conn,** director, process development; **Robert A. Steel,** director, process design and economics; and **Dr. B. H. Shoemaker,** director, exploratory research. **Dr. W. E. Kennel** will be director of chemicals research; **Dr. Robert B. Jacobs,** director of engineering research; and **Dr. E. W. Adams,** director of administration.

WHITE

John E. Clark, Union Oil Co., has been elected president of the Permian Basin Geophysical Society for 1960. Other new officers will be **E. E. Fickinger,** Continental Oil Co., first vice president; **B. H. Hinton,** with Ralph Lowe, second vice president; **L. M. Scofilde,** Burton Exploration Co., secretary; and **S. T. Miller,** Tennessee Gas Transmission Co., treasurer.

Arnold C. Matthies, now on overseas assignment with Esso Export Corp., will return next month to assume his former position as product manager, chemicals, for Enjay Co., Inc. **Harry W. Peterson, Jr.,** acting chemicals product manager, has been named manager of Enjay's mid-Atlantic district succeeding **T. Curry Jones.** Jones has been appointed assistant product manager, paraffins.

Al E. Beasley, Lafayette, La., district exploration manager for Southwest Gas Producing Co., Inc., has been promoted to general exploration manager of the company. He will headquarter in Monroe, La. Also, **Fred Plitt,** staff engineer, has been promoted to senior petroleum engineer in the production department. **Robert Wood,** chief clerk, has been elected assistant secretary-treasurer of the company. **Fred Golson** will succeed Wood.

Nelson Y. Ruth has been appointed an executive director of the Iraq Petroleum group of companies. Ruth joined IPC in August 1959, with special responsibility for exploration and production. He came from the Jersey Standard group, where he had served as a director of Carter Oil Co., as assistant coordinator of Jersey's worldwide production activities, and as a director of Jersey Production Research Co. Other new IPC executive directors are **N. M. Ekserdjian,** who has been associated with Gulbenkian interests, and who is responsible for concession matters and personnel policy; and **L. F. Murphy,** who has been with the British civil service and with Socony Mobil companies. Murphy has been chairman of Mobil Supply Co., Mobil Shipping Co., and managing director of Mobil Services Co.

▶▶▶ Personals

Edward D. Loughney, senior vice president of British American Oil Co., Ltd., has been elected president of the company. He succeeds **E. D. Brockett,** who was recently named executive vice president of Gulf Oil Corp. Loughney was executive assistant to the divisional vice president of Gulf in Tulsa before assignment to Canadian Gulf in 1951. He was vice president and general manager of Canadian Gulf, responsible for western Canada production and exploration, until merger of Canadian Gulf and British American in 1956. He has been vice president and a director of B-A since that time.

LOUGHNEY

Marshall E. Doyle has been named research supervisor in Shell Development Co.'s Emeryville, Calif., research center.

Thomas E. Matson, formerly chief geologist for Homestake Production Co., has opened consulting offices in Tulsa.

S. T. Algermissen, formerly with Sinclair Research Laboratories, Inc., in Tulsa, has been appointed assistant professor of geophysics at the University of Utah, Salt Lake City.

Dr. Richard F. Robey, section head for Esso Research & Engineering Co., has been appointed a research associate in the chemicals research division.

H. N. (Dusty) Rhodes, formerly special projects engineer for British-American Oil Producing Co. in Denver, has been named director of the Nebraska Oil and Gas Conservation Commission, Sidney.

Ewell E. Mitchell, production manager of the Port Neches, Tex., plant of Goodrich-Gulf Chemicals, Inc., has been named manager of the Institute, W. Va., plant. He succeeds **F. C. Hands,** who has been transferred to Cleveland.

Arthur H. Denny, superintendent of Pan American Petroleum Corp.'s Elk Basin gasoline plant, Powell, Wyo., has been named Canadian division gas superintendent for the company. He succeeds **Bryan C. Edwards,** who recently was named assistant manager of gas sales for Pan Am in Tulsa. Denny had been Elk Basin plant superintendent since 1953.

W. L. Morris and **A. D. McCall,** petroleum engineers with First National Bank & Trust Co. of Tulsa, have been promoted to assistant vice presidents. Both joined the bank in 1957.

Harold Bottomley, Tulsa consulting engineer, has been retained on a long-term contract by Treco construction division of Vitro Engineering Co. Bottomley was a vice president of Treco before becoming a consultant. He was also chief chemist and chief engineer for Cosden Petroleum Corp., chief engineer for Republic Oil & Refining Co., and assistant mechanical process engineer for Cities Service Oil Co. at one time.

Harry F. Warnke, assistant chief engineer of Delhi-Taylor Oil Corp.'s Corpus Christi, Tex., refinery, has been promoted to plant superintendent there. He succeeds **Frank A. Reneau,** who has been named safety and training director, manufacturing. **James H. Barnhart,** plant engineer in Corpus Christi, will succeed Warnke. **William H. Fair III,** chief mechanical engineer, moves up to succeed Barnhart. Fair will be succeeded by **Doyle Williams,** formerly senior mechanical engineer. **Walter E. Anderson,** mechanical engineer, has succeeded Williams as senior mechanical engineer.

In a move to streamline operations, Sinclair Oil & Gas Co. has changed status of its Jackson, Miss., office from division to district. The new district will be a part of the New Orleans division. **R. A. Wright** is vice president and manager of this division. **Roy E. Dosser,** Jackson division manager, has been transferred to Tulsa headquarters as executive assistant to the vice president and coordinator of operations. **H. C. Calhoun,** Jackson division exploration superintendent, has been named executive assistant to the vice president and coordinator of exploration in Tulsa. **G. O. Davis,** assistant Jackson division manager, has been named manager of the Jackson district office. **J. G. Harris,** Jackson district landman, has been transferred to New Orleans as staff assistant to the division superintendent of exploration. **J. M. Endres,** Tallahassee, Fla., district landman, will succeed Harris in Jackson. The Tallahassee district office has been closed and its activities will be handled by the Jackson office. Remaining in Jackson will be **T. C. Preston,** division production superintendent; **W. H. Hollingsworth,** division geologist; and **R. L. Schmidt,** division geophysicist.

Francois Didet has joined Sun Oil Co. in Marcus Hook, Pa., as research chemist.

Dr. Leo J. McCabe has joined Continental Oil Co.'s research and development department in Ponca City, Okla., as research chemist.

G. H. Alani, formerly with the Texas Petroleum Research Committee in College Station, Tex., has joined Gulf Oil Corp.'s Harmarville, Pa., research center as a project engineer in the production engineering division.

Harold C. Price, Jr., executive vice president of H. C. Price Co., has been elected president. He succeeds **Harold C. Price, Sr.,** now chairman. **R. K. Shivel,** general superintendent of the pipeline division, has been elected vice president. Price, Jr., has been with the company since 1950. He had been administrative manager of the pipeline department and vice president before being named executive vice president in 1958. Shivel was field superintendent on several of Price's biggest projects before being named general superintendent of the pipeline division in 1951. He joined the company in 1928.

PRICE

SHIVEL

O. G. Simpson, Sinclair Oil & Gas Co.'s division production superintendent in Midland, Tex., has been promoted to assistant Midland division manager. Simpson succeeds **R. L. Elston,** who was recently named vice president and Midland division manager. Simpson has been with Sinclair since 1949.

Ronald Ward, formerly Saskatchewan division geologist for Stekoll Oil & Gas, Ltd., has joined Delhi-Taylor Oil Corp. as staff geologist in the Dallas exploration division. **Leland W. Carter** has joined the Dallas natural gas and pipeline department as gas engineer. Carter was formerly gas engineer with Atlantic Refining Co. in Dallas. **James B. McKee,** formerly with Socony Mobil Oil Co., has joined Delhi-Taylor as geophysicist in Dallas.

Personals

John W. Mecom, Houston independent, has been elected to the board of governors of Rice Institute.

J. R. MacGregor, California Research Corp.'s vice president for petroleum products research, has been elected a director of the Society of Automotive Engineers.

P. B. McGrath, formerly manager of Cuba California Oil Co., has been named chief geologist of California Exploration Co. **M. E. Hoover** has been named senior staff geologist, basin evaluations, for California Exploration.

William Law, mechanical consultant in Interstate Oil Pipe Line Co.'s engineering department, has retired after 25 years with the company. Law was chief engineer and assistant general manager of the company's southern division at one time.

James T. Farrell, formerly engineer with Shamrock Oil & Gas Corp., has joined Petroleum Exploration, Inc., of Texas in Amarillo, Tex. He succeeds **P. D. Williams,** now engineer with Altair Oil & Gas Co. in Calgary.

William M. Land has joined Shell Development Co. as engineer in the chemical process engineering department of the Emeryville, Calif., research center. **Dr. Kenneth C. Dewhirst** has joined the company as chemist in the organic chemistry department, Emeryville.

James M. Killen, formerly technical consultant in the process engineering division manufacturing department, of Standard Oil Co. (Ohio), has been appointed chief process engineer of the company's Lima, Ohio, refinery. He succeeds **Fred M. Barnett,** who has been named superintendent of the lube plant in Lima. Killen has been with Ohio Standard since 1949.

M. F. Kirby, Gulf Oil Corp., Jackson, Miss., has been named 1960 president of the Gulf Coast Association of Geological Societies. Other officers elected at a recent executive committee meeting include **Dodd N. Osburn,** Union Producing Co., New Orleans, vice president; **William W. Woolfolk,** Ohio Oil Co., San Antonio, Tex., secretary; and **E. G. Jeffreys,** Jackson consultant, treasurer.

Forest C. Witmer has been named Durango, Colo., district geologist for Atlantic Refining Co.

Dr. Vincent L. Hughes has been named head of a new chemicals process section in Esso Research & Engineering Co.'s chemicals research division.

Fay T. Anderson, executive vice president of Petro-Atlas, Inc., Tulsa, has been elected president of the company. **Dale R. Snow** continues as chairman and chief executive officer.

Wheeler G. Lovell, Ethyl Corp., has been elected 1960 chairman of the American Chemical Society's division of petroleum chemistry. He succeeds **Dr. William E. Bradley,** Union Oil Co. **Dr. Charles L. Thomas,** Sun Oil Co., was named chairman-elect of the division.

Walter Brunn, special assistant to the general manager of Tidewater Oil Co.'s western marketing division, has retired after 37 years with the company. Brunn was division marketing manager before his appointment as special assistant earlier this year.

J. Clifton Williams, Jr., senior assistant engineer with Texas Eastern Transmission Corp. in Shreveport, La., has been promoted to division engineer in North Little Rock, Ark. Williams joined Texas Eastern in 1952 as a junior engineer in Baytown, Tex.

Dr. John J. Hawkins, formerly with Monsanto Chemical Co., has joined the research division staff of Petroleum Chemicals, Inc., in Lake Charles, La. He will be research group leader. **Dr. S. F. Chappell III, Dr. Ernest W. C. Mueller,** and **Arthur E. Hicks** have joined Petroleum Chemicals as research chemists. **H. G. Jackson** has joined the company as assistant research chemist.

M. F. Wirges, manager of Arkansas Fuel Oil Corp.'s natural gasoline division, has been appointed chief engineer of the company. He will also be in charge of economic and planning activities. Wirges succeeds **L. F. Babcock,** who will retire January 1. Wirges joined Cities Service Research & Development Co. in 1946. He was with Cities Service Oil Co. in Bartlesville, Okla., as assistant to the manager of the gasoline-chemicals division before moving to Arkansas Fuel Oil in 1957.

WIRGES

Norman E. Rawson has joined Pure Oil Co.'s Crystal Lake, Ill., research center as research engineer.

John Longwell has been named director of Esso Research & Engineering Co.'s new long-range research division. **Paul Smith, Jr.,** now assistant director in chemical research, will be assistant director of the new division.

William W. Rems, assistant manager of Sun Oil Co.'s central sales region, has moved up to manager of the region. He succeeds **James O. Craig,** who has retired. **Emory M. Osgood,** manager of retail sales in the central region, will succeed Rems.

Loyd C. Fons, former midwest area manager for Seismograph Service Corp.'s Birdwell division in Robinson, Ill., has been named sales manager for the division. He will headquarter in Tulsa. **William Sturdevant,** Oklahom area manager in Tulsa, will succeed Fons in Robinson. **Joseph Ferguson,** area manager for continuous velocity logging operations, has been appointed Mid-continent area manager, Birdwell division.

Deaths

W. O. (Sonny) Calvert, 53, a pioneer in the overseas sale of oil equipment, died recently in Houston. He was representative for a number of Houston manufacturers and before settling in Houston had been in Europe and the Middle East as representative of Mission Manufacturing Co. and Thornhill-Craver Co.

R. Homer Gafford, 62, drilling industry veteran, died recently in a Big Spring, Tex., hospital. Gafford was with J. P. Gibbons Co., and Pan American Petroleum Corp. during his career.

Arthur Francis Brann, 67, Wichita independent operator, died December 21 at his home after a brief illness. Brann had been in the oil business since 1914.

James W. Loveys, 47, manager of public relations for Texaco Canada, Ltd., died December 7 in a Montreal hospital.

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CHIYODA CHEMICAL ENGINEERING & CONSTRUCTION CO., LTD., Japan's most experienced and leading fabricator of process equipment such as heat exchangers, coolers and condensers, has been serving the petroleum and chemical industries of the world for many years. Chiyoda has been receiving inquiries from American oil refining companies and contractors and has exported heat exchangers, vessels and towers to several major projects in construction. Repeat orders are being welcomed, which is evidence of Chiyoda's expert workmanship, early delivery and competitive prices.

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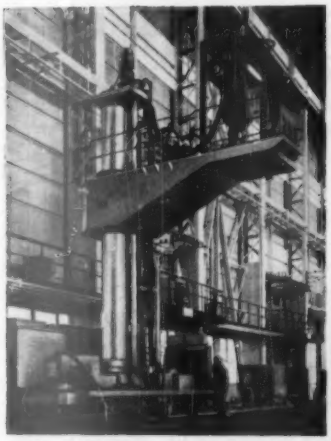

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- Chemical reactors
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- Heaters
- API standard tanks
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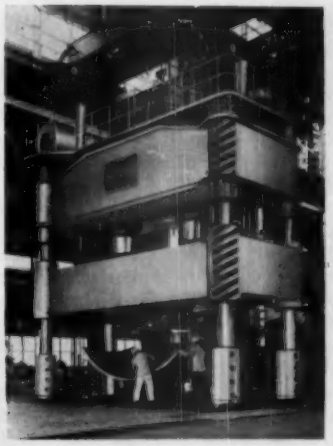
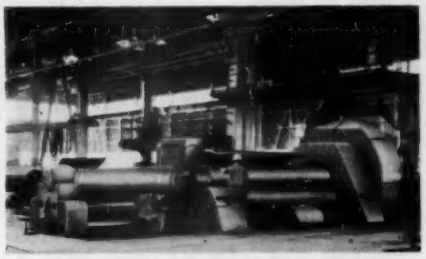


1,500-ton Hydraulic Press



4 Rolls Bending Roller

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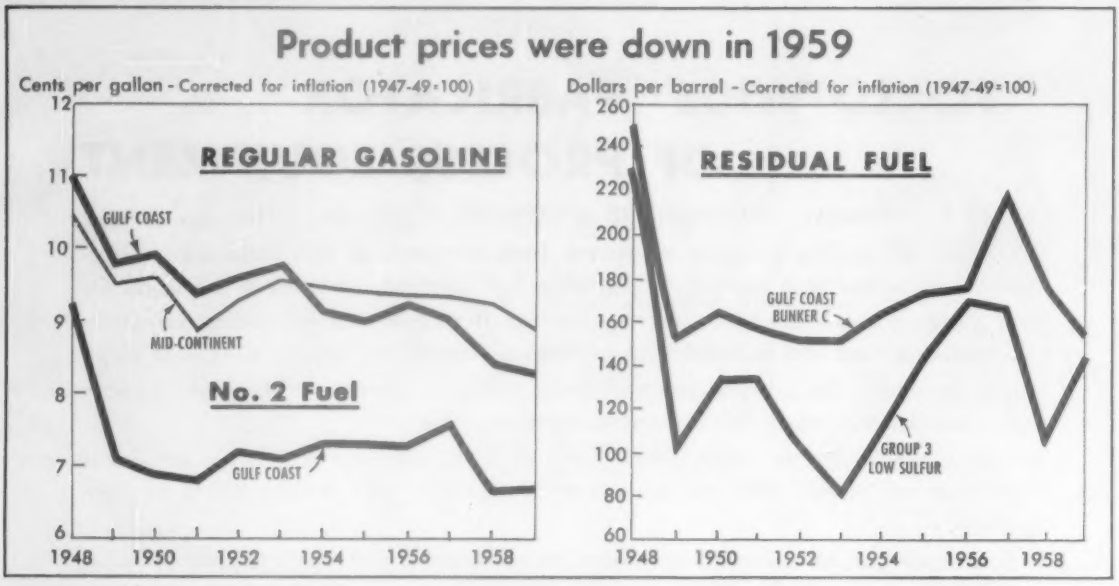


Oil prices have been low this year

BY JOHN C. CASPER

OIL PRICES in true-value dollars were down about 2.4% in 1959. For example, the wholesale price index of crude and petroleum products averaged 116.8 for the first 11 months of this year. There have been some changes in December, but they tend to offset each other.

In the past month gasoline prices have decreased in the Group 3 area, in the North Central states, on the Gulf Coast, and in some states on the East Coast. Distillate prices have risen in these same market areas, but winter sales of distillate and kerosine are only about 75% of gasoline sales. These shifts indicate a final price index for petroleum no higher than 117.0 for 1959 compared with 117.7 for 1958. (These are wholesale price indexes as reported by the Department of Labor.)

But the wholesale price index for all commodities other than farm products and food will average 128.3 compared with 126.0 last year.

If correction is made for this inflation of the wholesale dollar, petroleum prices this year will have an index of 91.2 compared with 93.4 last year. This is a loss of 2.4%.

For more detailed comparisons take a look at the charts. The prices represented by these lines have been corrected for inflation. They are expressed in 1947-49 dollars.

Note first that Gulf Coast gasoline has been in a price skid since 1948. There was some price erosion in 1959, but this was due more to the devaluation of the dollar than to actual changes in postings. In true-value currency, the Gulf Coast price for regular gasoline dropped to 8.30 cents a gallon this year from 8.38 cents last year. The reduction since 1948 has been 2.73 cents a gallon or 25%.

On the same basis, Group 3 gasoline dropped 1.65 cents a gallon or 15.7% for the 1948-59 period. But for the single year 1959, gasoline prices have been off more in the Group 3 area than on the Gulf Coast.

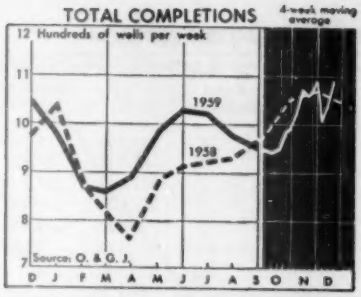
No. 2 distillate on the Gulf Coast showed a slight price gain over 1958 despite the soft market in the last half of the year. The gain was possible only because 1958 was a very bad price year for light heating oil on the Gulf Coast.

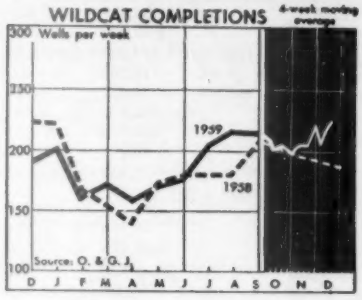
Spot quotations for Bunker C fuel on the Gulf Coast have been at $2.00 a barrel all year. This is equivalent to $1.56 in 1947-49 dollars. The average quotation for low-sulfur fuel on the Group 3 market has been about $1.84 a barrel. Corrected for inflation, this amounts to $1.44 compared with $1.08 last year.

Average crude prices will show a definite loss this year even though actual cuts in price postings have been fewer and smaller than last year. Many of the 1958 reductions came in the last half of the year. They will cover a full year's production in 1959 compared with only a few months in 1958. The average crude price for 1958 was 8 cents below that for 1957. This year will show another drop of at least 6 cents.

A quick look at the highlights

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,168,610	UP	25,110	UP	61,060
Crude stocks	253,643,000	UP	1,030,000	DOWN	5,076,000
Completions	1,181	DOWN	104	UP	95
Refinery runs	8,071,000	UP	96,000	UP	249,000
Gasoline stocks	182,838,000	UP	1,588,000	UP	4,239,000
Kerosine stocks	27,195,000	DOWN	1,818,000	DOWN	741,000
Distillate stocks	156,195,000	DOWN	4,292,000	UP	18,013,000
Residual stocks	52,476,000	DOWN	1,406,000	DOWN	8,192,000
Four-product stocks	418,704,000	DOWN	5,928,000	UP	13,319,000
Total imports	1,775,700	UP	37,400	DOWN	131,400





Active Rotary Rigs

	12-21-59	12-14-59	12-22-58
Alabama	5	5	10
Arkansas	13	18	23
Arizona	0	0	1
California	89	97	89
Land	83	90	(*)
Offshore	6	7	(*)
Colorado	43	36	39
Florida	1	2	0
Land	1	2	0
Offshore	0	0	0
Illinois	41	47	55
Indiana	7	5	9
Iowa	0	0	3
Kansas	160	153	180
Kentucky	10	7	9
Louisiana	307	320	326
North	42	39	37
S. Inland waters	110	112	135
S. Land	101	115	115
Offshore	54	54	39
Maryland	0	0	0
Michigan	42	35	12
Mississippi	79	79	70
Missouri	0	1	1
Montana	23	25	21
Nebraska	27	29	20
Nevada	0	0	0
New Mexico	115	132	101
New York	0	0	1
North Dakota	31	28	36
Ohio	3	0	3
Oklahoma	238	255	263
Oregon	0	0	0
Pennsylvania	13	12	9
South Dakota	4	4	0
Texas	760	775	953
S. Inland waters	8	6	6
S. Land	214	198	219
Offshore	0	0	2
North-East	193	200	202
West Central	229	236	358
West	116	135	166
Utah	30	30	38
Washington	1	1	0
West Virginia	3	4	2
Wyoming	72	81	82
Total U. S.	2,117	2,181	2,356
Western Canada	218	213	208
Eastern Canada	1	1	1
Grand Total	2,336	2,395	2,565

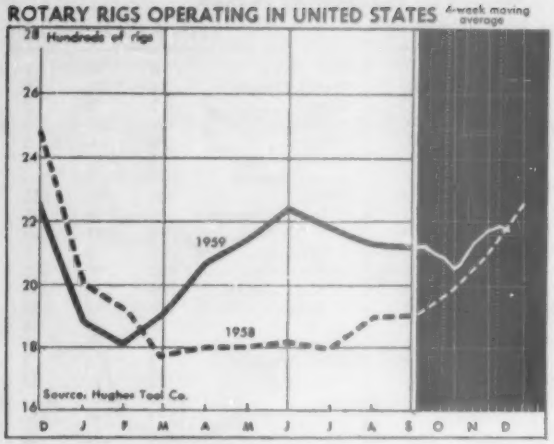
Hughes Tool Co. report. *Comparisons not available due to change in method of reporting.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 19, 1959

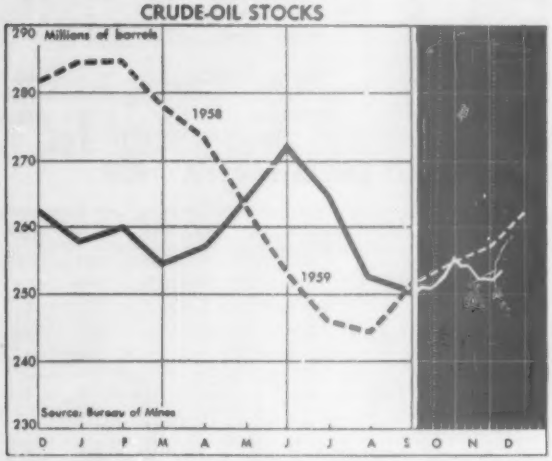
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	8	8	0	0	0	0	92,324	95	75	0	0	0	0	0	23	29
Arizona	0	0	0	0	0	0	0	26	.....	0	0	0	0	0	24	.....
Arkansas	18	13	0	0	5	0	52,291	829	809	2	0	0	0	2	145	158
California	33	13	0	3	10	7	172,544	1,493	1,458	7	0	0	0	7	394	357
Colorado	19	3	0	2	14	0	105,768	762	818	11	1	0	0	10	431	470
Illinois	40	25	0	0	15	0	83,918	2,287	2,373	6	1	0	0	5	383	439
Indiana	28	15	0	0	13	0	32,472	846	854	10	0	0	0	10	288	303
Kansas	88	39	0	6	43	0	318,934	3,861	3,921	26	3	0	1	22	1,038	822
Kentucky	136	113	0	1	22	0	91,168	3,192	1,959	11	1	0	0	10	365	175
Louisiana	91	39	11	5	36	0	637,380	3,690	3,441	13	1	0	0	12	493	513
North	43	21	0	4	18	0	136,192	1,477	1,347	8	1	0	0	7	228	230
South	38	12	10	1	15	0	390,778	1,809	1,682	5	0	0	0	5	250	256
Offshore	10	6	1	0	3	0	110,410	404	412	0	0	0	0	0	15	27
Michigan	12	6	0	0	6	0	41,614	637	423	2	0	0	0	2	180	141
Mississippi	20	9	2	0	9	0	200,312	626	390	7	0	1	0	6	273	171
Montana	8	5	0	0	3	0	34,963	331	325	1	0	0	0	1	116	130
Nebraska	20	5	0	0	15	0	117,803	880	710	13	2	0	0	11	393	339
New Mexico	49	25	4	8	12	0	187,434	2,049	1,884	11	2	1	0	8	253	261
West	16	4	4	8	0	0	74,180	897	922	1	0	1	0	0	64	98
East	33	21	0	0	12	0	113,254	1,152	962	10	2	0	0	8	189	163
New York	0	0	0	0	0	0	0	279	544	0	0	0	0	0	22	44
North Dakota	9	5	0	0	4	0	60,104	421	438	1	0	0	0	1	78	132
Ohio	25	12	0	9	4	0	73,882	1,063	1,008	1	0	0	0	1	32	18
Oklahoma	90	34	4	14	38	0	401,612	5,262	6,210	24	1	1	5	17	811	838
Pennsylvania	0	0	0	0	0	0	0	581	573	0	0	0	0	0	21	21
South Dakota	2	1	0	0	1	0	17,096	22	.....	1	0	0	0	1	10	.....
Texas	422	242	13	20	137	10	1,724,867	18,065	17,629	79	9	1	5	64	3,436	3,526
District 1	21	13	0	0	8	0	53,588	1,048	968	5	0	0	0	5	318	359
District 2	10	0	3	4	3	0	72,561	781	713	3	0	1	1	1	227	190
District 3	22	11	3	2	6	0	145,347	1,144	1,271	4	0	0	0	4	226	277
District 4	34	5	3	7	19	0	133,716	1,308	1,136	18	1	0	4	13	340	336
East	22	10	1	0	11	0	111,655	1,209	1,193	9	0	0	0	9	243	323
District 7-B	55	28	0	1	22	4	149,384	2,546	2,502	11	0	0	0	11	675	674
West	141	111	2	1	27	0	701,448	5,381	5,024	20	8	0	0	12	736	682
District 9	87	43	0	3	35	6	223,394	3,414	3,531	9	0	0	0	9	564	564
District 10	30	21	1	2	6	0	133,774	1,234	1,291	0	0	0	0	0	107	119
Utah	6	5	0	0	1	0	35,404	296	380	0	0	0	0	0	88	82
West Virginia	20	2	0	10	8	0	52,308	770	756	0	0	0	0	0	28	22
Wyoming	34	11	1	0	21	1	152,200	955	747	19	2	1	0	16	358	258
Misc. (Alaska)	3	0	0	3	0	0	25,867	93	94	1	0	0	1	0	58	84
Total U. S.	1,181	630	35	81	417	18	4,712,265	49,411	47,819	246	23	5	12	206	9,741	9,333
Prev. week	1,285	636	25	95	486	43	4,781,171	.....	.....	262	16	2	7	237	.....	.....
Cum. 1959	49,411	24,696	1,210	3,641	18,492	1,372	202,918,697	.....	.....	9,741	861	108	323	8,449	.....	.....
Cum. 1958	47,819	23,636	1,093	3,563	18,170	1,357	192,888,600	.....	.....	9,333	898	151	262	8,022	.....	.....
Western Canada	59	29	0	10	17	3	305,589	2,357	2,391	20	1	0	5	14	656	627

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	12-12-59	12-5-59	12-13-58
Pennsylvania	2,384	2,423	2,720
Other Appalachian	2,077	2,141	1,731
Illinois, Indiana, Michigan	10,258	10,217	10,038
Nebraska and North Dakota	3,294	3,052	2,340
Kansas	9,381	9,436	10,233
Oklahoma	15,947	15,849	17,033
Arkansas	2,231	2,163	2,413
Louisiana	17,933	18,487	16,949
North	3,605	3,398	2,971
South	14,328	15,089	13,978
Mississippi, Alabama, Florida	2,240	2,240	2,273
New Mexico	8,397	8,322	8,225
Texas	111,310	109,908	115,728
East Texas	7,954	7,816	8,585
West Texas	52,813	51,606	56,711
Texas Gulf	20,812	19,919	20,499
Other Texas	29,731	30,567	29,933
Wyoming	16,916	17,044	12,961
Other Rocky Mountain	9,697	9,375	9,033
California	28,726	28,546	32,819
Foreign	†12,852	13,410	14,223
Total	**253,643**	252,613	258,719

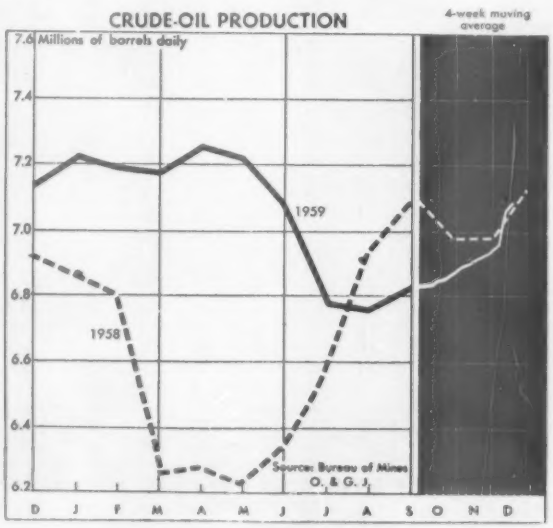
*Bureau of Mines. †Includes 4,208,000 bbl. in California.

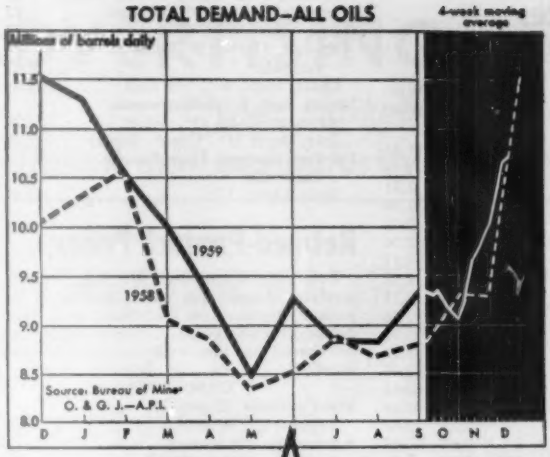
DAILY AVERAGE PRODUCTION FOR WEEK

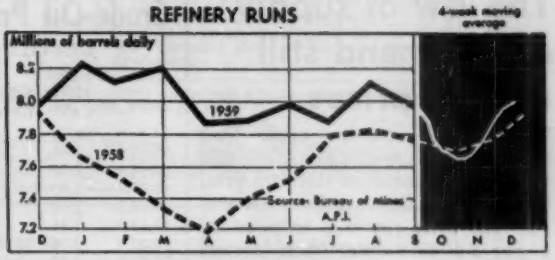
	December 19, 1959			Dec. 12
	Crude oil	Lease condensate	Total	total
Alabama	15,500	.....	15,500	15,750
Arkansas	83,000	300	83,300	84,300
California	838,400	.....	838,400	837,800
Colorado	127,000	.....	127,000	126,600
Eastern	41,000	.....	41,000	39,800
Florida	1,170	.....	1,170	1,170
Illinois	220,300	.....	220,300	216,700
Indiana	32,100	.....	32,100	31,800
Kansas	†334,760	.....	†334,760	†333,000
Kentucky	75,500	.....	75,500	75,000
Louisiana	929,000	118,000	1,047,000	1,047,100
North	108,000	6,000	114,000	114,100
South	821,000	112,000	933,000	933,000
Michigan	34,400	.....	34,400	34,300
Mississippi	140,920	5,050	145,970	145,970
Montana	80,000	.....	80,000	80,300
Nebraska	63,900	.....	63,900	63,600
Nevada	100	.....	100	100
New Mexico	289,600	6,500	296,100	296,100
North Dakota	56,700	.....	56,700	50,100
Oklahoma	†566,200	.....	†566,200	†560,500
Texas	2,566,000	81,200	2,647,200	2,647,200
Dist. 1	43,000	3,000	46,000	46,000
Dist. 2	110,000	8,800	118,800	118,800
Dist. 3	334,000	38,000	372,000	372,000
Dist. 4	180,000	9,800	189,800	189,800
Dist. 5	26,000	400	26,400	26,400
Dist. 6	107,000	9,500	116,500	116,500
East Texas field	141,000	.....	141,000	141,000
Dist. 7-B	128,000	180	128,180	128,180
Dist. 7-C	125,000	3,320	128,320	128,320
Dist. 8	1,059,000	5,000	1,064,000	1,064,000
Dist. 9	205,000	2,200	207,200	207,200
Dist. 10	108,000	1,000	109,000	109,000
Utah	117,600	.....	117,600	112,500
Wyoming	344,000	.....	344,000	343,400
Others	‡410	.....	‡410	‡410
Total U. S.	6,957,560	211,050	**7,168,610**	7,143,500
Change from prev. week up		.....	**25,110**	.....
Canada	†562,400	.....	†562,400	†501,900
Total U. S. Prod., Jan. 1-Dec. 19				2,484,272,830 bbl.
Same period last year (crude plus cond.)				*2,363,039,230 bbl.

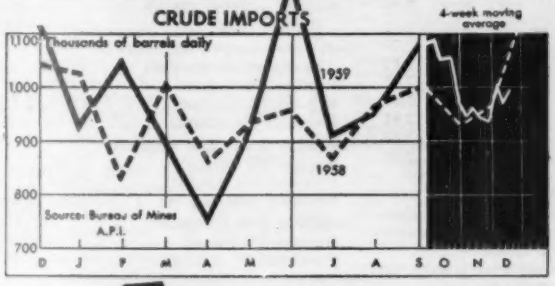
*Includes 56,346,260 bbl. condensate. †Week ended previous Monday. ‡Arizona, South Dakota and Washington.

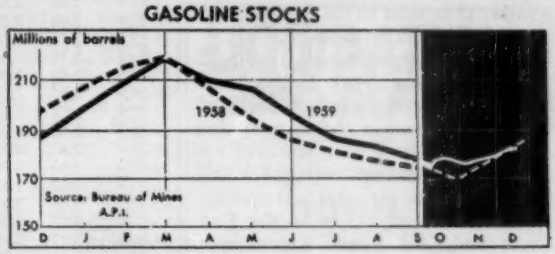
CRUDE-OIL PRODUCTION

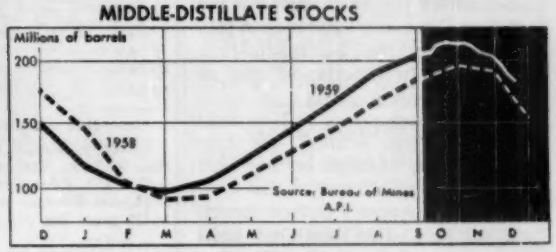


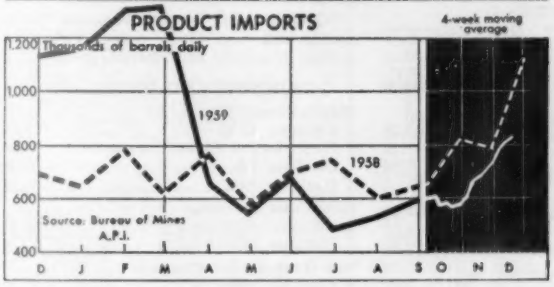


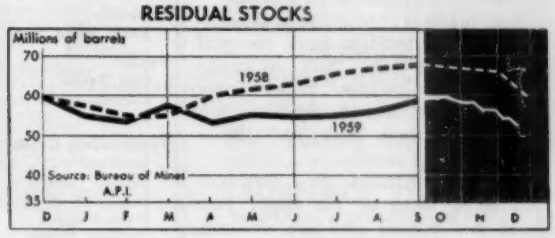












API REFINERY REPORT—DECEMBER 18, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, December 1958: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.
East Coast	1,096	515.6	21.6	311.7	165.9	40,125	12,121	61,942	10,963	1,149	575.7	36.4	383.1	213.1
Appalachian:														
District 1 ...	104	43.0	5.9	27.9	13.9	5,787	761	4,331	358	102	42.6	5.8	20.3	12.1
District 2 ...	110	57.0	8.0	16.0	26.3	2,788	457	1,714	456	102	51.5	5.0	21.1	16.1
Ind., Ill., Ky....	1,545	800.5	84.6	355.1	208.4	31,414	5,742	23,774	5,249	1,450	738.1	70.7	335.8	205.7
Minn., Wis., Dak.	121	58.1	4.4	32.0	18.1	7,205	1,285	6,940	681	109	53.8	5.5	29.5	14.0
Okla., Kans., Mo.	672	350.3	19.1	188.4	34.0	17,703	1,258	10,832	1,169	761	427.8	17.7	203.7	37.7
Inland Texas ..	295	219.6	10.0	48.6	21.6	6,936	472	1,796	2,355	286	216.2	7.5	46.1	25.2
Texas Gulf Coast	1,927	1,035.3	145.7	453.0	151.6	23,468	2,466	19,340	4,933	1,864	960.1	128.4	506.8	184.3
La. Gulf Coast.	721	351.7	67.6	145.0	45.9	9,589	1,418	7,107	1,066	665	372.8	82.9	139.3	57.2
N. La. and Ark.	111	42.3	8.0	18.1	7.0	4,811	573	2,499	183	95	48.3	4.8	22.6	6.0
Rocky Mountain:														
New Mexico .	19	12.3	0.1	3.6	1.7	899	26	191	53	25	12.8	0.7	4.2	2.4
Other	290	144.0	4.6	67.4	33.1	5,322	234	2,483	1,156	268	130.1	3.0	64.8	35.0
West Coast	1,060	560.4	1.4	192.9	262.4	26,791	382	13,246	23,854	1,085	515.8	5.6	177.4	295.9
Dec. 18, 1959 .	8,071	4,190.1	381.0	1,859.7	989.9	182,838	27,195	156,195	52,476	7,961	4,145.6	374.0	1,954.7	1,104.7
Dec. 11, 1959 .	7,975	4,036.3	337.4	1,949.0	992.1	181,250	29,013	160,487	53,882	.....	.....	.....	.....	.....
Dec. 19, 1958	7,822	4,050.9	350.7	1,981.7	1,079.0	178,599	27,936	138,182	60,668	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

The law of supply and demand still sets oil prices

MARKETERS on the upper East Coast need a few weeks of cold weather to consolidate distillate price increases that came early in December. The price rise was followed by a period of warmer - than - normal weather over most of the high-demand areas on the East Coast.

Price for barge delivery of No. 2 fuel in the New York Harbor area has been 9.6 cents a gallon since the half-cent increase at the start of this month. There have been scattered reports of discounting.

Increasing tanker rates add another factor influencing prices on the East Coast and Gulf Coast. Recent spot quotations for tanker charters for the Gulf-East Coast run have been ATRS plus 15%. For No. 2 distillate fuel, this means a transportation cost of about 1.06 cents a gallon.

If East Coast prices fail to hold because of warm weather, the drop will produce a reaction on the Gulf Coast. Distillate stocks on the Gulf Coast are up almost 7 million barrels from last year. The East Coast total shows a gain of almost 10 million.

Any important reduction in the normal flow of distillate from the gulf to East Coast would back up stocks in Gulf Coast refiners' tanks. Soon, someone would feel the need to sell a few cargoes even if it took lower prices to make a sale.

The pre-Christmas snow that covered large areas of the upper East Coast has helped distillate demand, and normal weather for the month of January would bring a better supply-demand balance.

Kerosine price on the Gulf Coast moved up another quarter cent a gallon at the start of Christmas week. This raises the cargo price to 9.50 cents a gallon and the spread between kerosine and No. 2 to 1.125 cents.

The Gulf Coast price spread has ranged near half a cent a gallon for several years, long enough for some marketers to decide that half a cent is the normal spread for these products. A few years earlier, 1 cent was considered "normal." The spread of 1.125 cents is based on the current balance between supply and demand for these two products.

Enough nonbranded jobbers in the Group 3 area are buying premium gasoline at 2.5 cents above regular to establish this price as the low of the premium market.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill§ Calif.	Okla-homa	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.76	....	....	....	....
15-15.9	1.84	....	....	....	$1.81
16-16.9	1.92	....	....	....	1.86
17-17.9	2.00	....	....	....	1.91
18-18.9	2.08	....	....	....	1.96
19-19.9	2.16	....	....	....	2.01
20-20.9	2.24	$2.49	....	$2.35	2.06
21-21.9	2.32	2.52	....	2.38	2.11
22-22.9	2.39	2.55	....	2.41	2.16
23-23.9	2.46	2.58	$3.44	2.44	2.21
24-24.9	2.53	2.61	3.46	2.47	2.26
25-25.9	2.60	2.64	3.48	2.50	2.31
26-26.9	2.67	2.67	3.50	2.53	2.36
27-27.9	2.74	2.70	3.52	2.56	2.49
28-28.9	2.81	2.73	3.54	2.59	2.54
29-29.9	2.87	2.76	3.56	2.62	2.59
30-30.9	2.93	2.79	....	2.65	2.63
31-31.9	3.00	2.82	....	2.68	2.67
32-32.9	3.06	2.85	....	2.71	2.71
33-33.9	3.12	2.88	....	2.74	2.75
34-34.9	3.17	2.91	....	2.77	2.79
35-35.9	3.22	2.94	....	2.80	2.83
36-36.9	3.27	2.97	....	2.83	2.87
37-37.9	3.31	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 9-11-59; East of California, January 3-10, 1957; Pennsylvania Grade 9-12-59.

§Union Oil Co. of California posting up to 25 cents less per barrel.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.40
Middle District	4.22
Southwest Pennsylvania	3.95
West Virginia	3.77
Buckeye Grade	3.62
Illinois Basin	**3.00**

FOREIGN

Canada:	
Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38
Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.80
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.57

Refined-Product Prices

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (91 octane)	10.25
★ Premium (99 octane)	12.75-13.00
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.25-10.50
Regular (92 octane)	10.50-10.75
Premium (98 octane)	11.75-12.00
California (rack) Los Angeles):	
Regular (88 octane)	11.65-12.15
Premium (94 octane)	12.65-13.15
Premium (100 octane)	14.00-14.65
Caribbean area (cargoes):	
Regular (87 octane)	10.125
Premium (97 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.25
Diesel oil (58 d.i. and above)	10.00
Distillate No. 1	10.00
Distillate No. 2	9.25
Gulf Coast (cargoes):	
★ Kerosine 41-43	9.50
Distillate No. 2	8.375
New York Harbor (barges):	
★ Kerosine 41-43	10.30
Distillate No. 2	9.60
Diesel fuel, 48-52 d.i.	9.90
Caribbean area (cargoes):	
Distillate No. 2	8.375

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max 1% S)	$1.80-1.90
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

★ Carib.-USNH, dirty (ATRS—35%)	$1.79
★ Carib.-Brazil, dirty (ATRS—40%)	3.39
★ PG-USNH, dirty (USMC—60%)	5.08
★ Carib.-UK, dirty (Scale—47.5%) (25s. 5d.)	3.56

★ Denotes change from previous week.

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18" AND 20" good used pipe. Very attractive prices. Contact: The Tri-State Pipe Co., Bellaire, Ohio. Telephone OR 6-1452.

1 BUCYRUS—ERIE 36L Spudder, late model. Rig complete with tools and equipment. Cassel Drilling Co., Inc., Dumas, Texas. Phone WE-5-5019 or WE 5-4389.

FOR SALE—large quantity, good used 10¾" pipe, 35 pounds to foot. 8⅝" eight inch pipe, 28 pounds to foot. Six inch pipe. Large quantity steel plates. Priced to sell. Phone CA 6-0821, Lima, Ohio, or write, West Ohio Pipe Co., P. O. Box 193, Lima, Ohio.

20,000' 6⅝" O.D. x .250" wall, plain end used line pipe. 30,000' 10¾" O.D. x .307" wall, plain end used line pipe. Other sizes in stock. The Buckeye Supply Company, 18 Harrison Street, Zanesville, Ohio, Phone GLadstone 2-3641.

2 COMPLETE UNIT rigs for sale U-15 drawworks. 1 rig is powered by 3 NKU Waukesha engines. 1 rig powered by 2 LRO Waukesha engines. Drill pipe and collars optional. Rigs may be seen at Henson Drilling Company yard in Abilene, Texas. Complete inventory on request.

—PIPE—
500,000 ft. 10¾" O.D. 35#
200,000 ft. 8⅝" O.D. 28½#
100,000 ft. 12¾" O.D. 40#
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WELL DRILLS—CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

1956 MAYHEW 2,000 drilling rig, 58 foot mast on International 190 Tandem. Complete with doghouse and accessories. $20,000. P. O. Box 1049, Tulsa, LUther 2-6291.

DRILLING RIG for sale to highest bidder, National Ideal Type 110, complete w/142' Lee C. Moore Cantilever type mast less rotary table, drill pipe and collars. Inventory list will be mailed together with bidding instructions upon request. All bids must be postmarked not later than December 31, Shell Oil Company, P. O. Box 1509, Midland, Texas, Attention Mr. J. W. Benn.

BUDA POWER UNITS: Unused surplus, new condition. Four cylinder, 121 HP Gasoline Engines. Complete with Radiator. Twin Disc Clutch and 5 Sheave V Belt Drive Pulley. Can be operated on LP or Natural Gas. Priced at fraction of cost, $1495.00 each. Photograph and complete specifications on request. Oldfield Equipment Co., 430 West Seymour Ave., Cincinnati 16, O.

Drill Pipe
New—171 Joints 3½" A.P.I.—13.30# American Flush Welded Tool Joints National Seamless External Upset Drill Pipe, Grade D, Range, 2, Approximately 5,400'—Drilled only 1,700' **$17,500.00**

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Bethlehem M-350 Drawworks R.I.C. 250 H. P. 4,500' complete with Drum-Line-Jack and Cat Shaft, Rotary Clutch 4 Speeds, Locking Type Skids with Engine V-Belt Compound **$8,000.00**

Pump—T 380 Clark Triplex
Complete w/sheave w/wide faced Herringbone Bearings of Heat Treated Alloy Steel, Splash Controlled Lubrication, 3,000# Working Pressure Fluid End Valve Over Valve Construction Mounted on 15' x 10½" x 16" 64# Standard Beam **$5,000.00**

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Two 6 Cylinder EKU Waukesha Drilling Engines, W/Vortox Oil Bath Air Cleaner W/Twin Disc Clutch, W/Starting Unit Model ICK 2⅛" x 3⅛" Four Cylinder Gasoline Engine, etc. **$7,000.00**

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4' x 44'6"—150 PSI 12 trays
3'6" x 36'4"—400 PSI 12 trays
30" x 52'4"—360 PSI 22 trays
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7860 CFM 2 stage CENT. 153PSIG
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30—55,000 bbl.
1—37,500 bbl.
1—29,000 bbl.
9—10,000 bbl.
5—5,000 bbl.
20—1,000 to 3,750 bbl.

3—5,000 bbl. Hortonspheres
1—5,000 bbl. Spheroid
2—10,000 bbl. Spheroid

5,000 TONS TANK PLATE
From 1/4" to 3/4"

19,000 bbl. M4 FLUID CAT CRACKER UNIT (New 1953)

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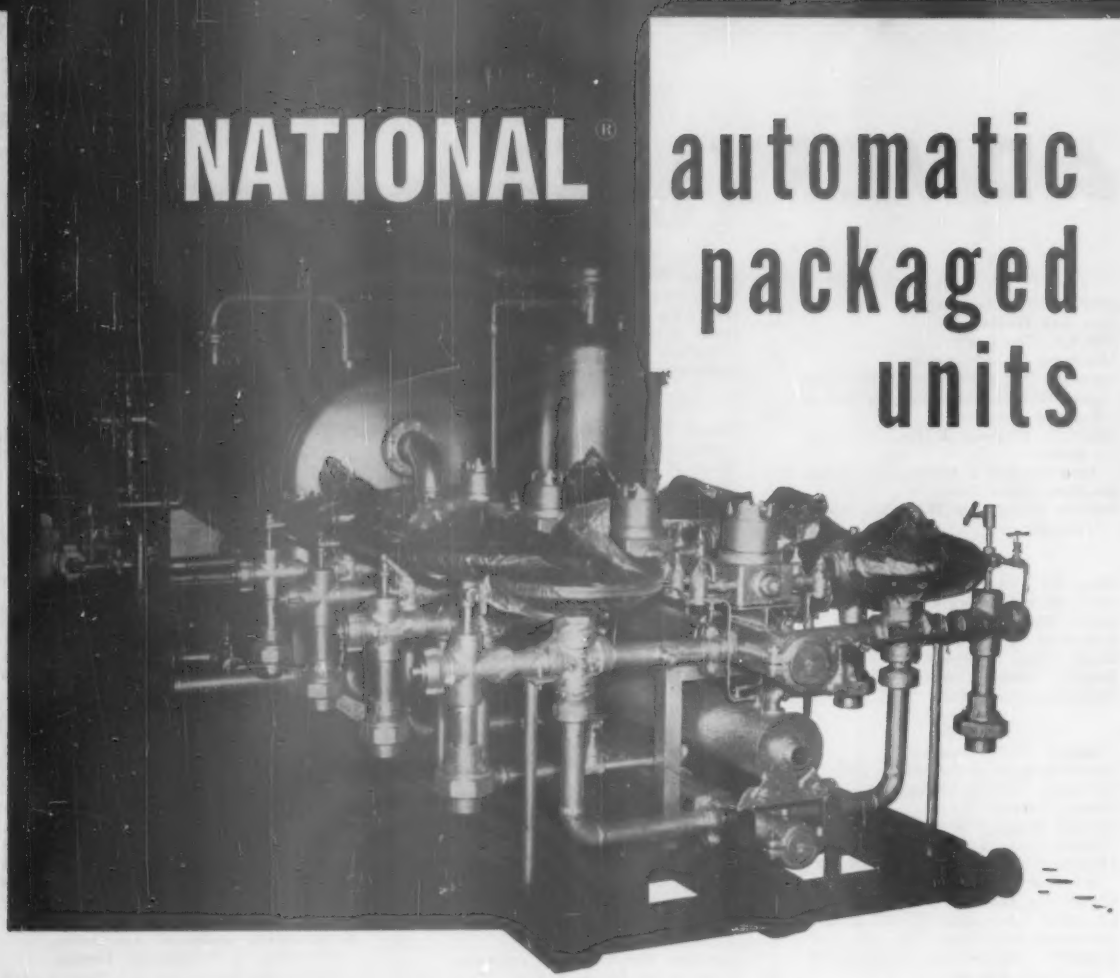

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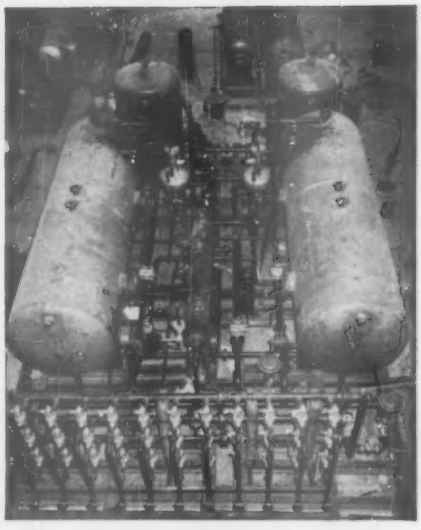

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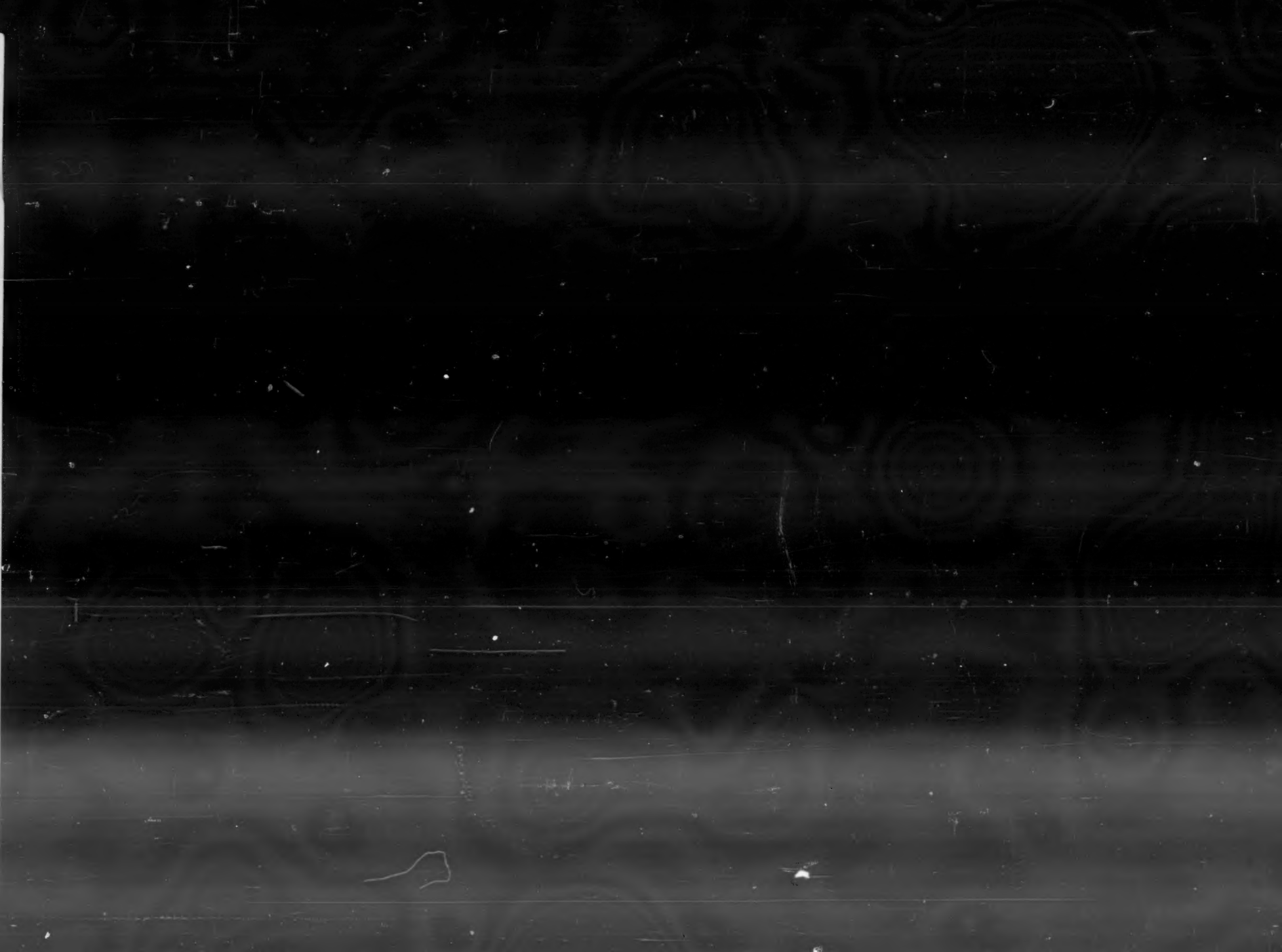

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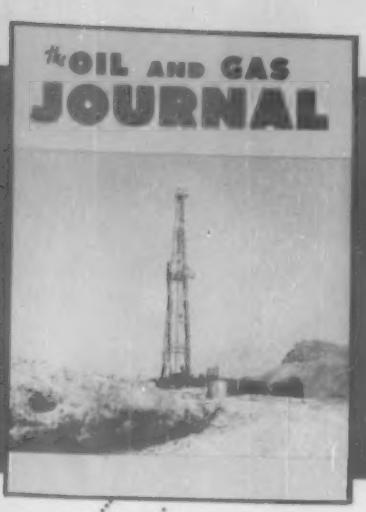

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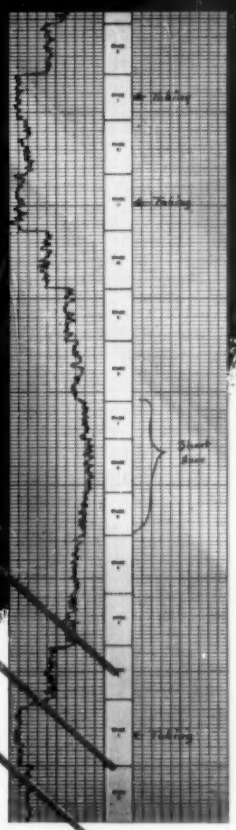
Lane-Wells new Directional Perforating Service safely and positively perforates a single string in a multiple string, tubingless completion on a single run in the well. The other casing strings in the well are not used in any way—they may be kept on production during the entire operation.

A Collar Log and a complete record of pipe and perforation orientation are made at the surface for positive checking at each stage of the operation.

For additional information about this new service ask your Lane-Wells representative or write:



LANE-WELLS COMPANY

A DIVISION OF DRESSER INDUSTRIES, INC.

P. O. BOX 1407 • HOUSTON 1, TEXAS

His job is to help you cut costs with a...

HUGHES ENGINEERED BIT PROGRAM

He may be a field engineer, special field salesman, or special representative.

But regardless of his title, he'll be a rock bit specialist. Very likely he will have spent a minimum of ten years in the field . . . generally more. He will be familiar with about every type of drilling problem you may encounter in the area in which you are drilling.

His specialty is helping you to determine the combination of bits and drilling techniques that will get your hole down in the shortest time and with the fewest bits. More and more operators are discovering the advantages of sitting down with these Hughes men and developing an *Engineered Bit Program* for each well.

Give your Hughes representative an opportunity to work with you on your next well. Through him, Hughes will make available to you the latest information concerning the types of bits and drilling techniques that have been successful in lowering drilling costs.

HUGHES TOOL COMPANY

50TH ANNIVERSARY YEAR 1909 – 1959